



# **Atmospheric Pollution & Climate Change (APCC) Environmental Information System (ENVIS) Resource Partner**

(Sponsored by Ministry of Environment, Forest & Climate Change, Govt. of India)

## **COMPENDIUM OF EXTREME WEATHER & AIR POLLUTION EVENTS**

**Global & National  
2020-21**

**INDIAN INSTITUTE OF TROPICAL METEOROLOGY  
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Indian Institute of Tropical Meteorology (IITM), Pune is a Resource Partner to Environmental Information System (ENVIS) on thematic area of Atmospheric Pollution & Climate Change (APCC). IITM-ENVIS works on generating knowledge products and spreading awareness through various activities, as a part of this we compiled the Extreme Events that occurred every year. The Extreme Weather Events which occurred in the year 2021 are compiled in this publication. This book has short descriptions of such events with respect to region affected and magnitude of the events. We have tried to cover the major episodes of such events from India and around the world and classify into categories which are simple to understand and easy to refer.

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# Extreme Weather Events – National

## 1. Heat Wave

**A heat wave, or heatwave,** is a period of excessively hot weather, which may be accompanied by high humidity, especially in oceanic climate countries. While definitions vary, a heat wave is usually measured relative to the usual weather in the area and relative to normal temperatures for the season. Temperatures that people from a hotter climate consider normal can be called a heat wave in a cooler area if they are outside the normal climate pattern for that area. Heat waves may span several days to several weeks and are significant causes of weather-related mortality, affecting developed and developing countries alike.



### Formation

A heatwave occurs when a system of high atmospheric pressure moves into an area and lasts two or more days. In such a high-pressure system, air from upper levels of our atmosphere is pulled toward the ground, where it becomes compressed and increases in temperature.

### Adverse Impact

#### a. Human Health

Heat waves are most likely to affect people who work or live outdoors.

- Heat stress causes dehydration and loss of body salt. That throws off the chemistry of the body.
- As the body tries to cool, it taxes the heart. That can lead to failure in people with heart conditions.
- When the core body temperature rises beyond 104 F, organs fail. The gut leaks toxins into the body, creating a deadly inflammatory response called heat stroke.

## **b. Environment**

Heat Wave can cause significant damage to nature and environment

- The heat dried out vegetation, creating tinder for fires. Wildfires are driven more by the temperature and moisture content in the air than by the moisture content in the soil.
- Increased body temperature or heat stress will cause production losses in livestock and impact on their ability to maintain normal function.
- The heat also killed fish, wild horses, and camels. In 2014, an Australian heat wave killed more than 45,000 bats of various species.

### **1.1 2020 was 8th warmest year since 1901; 1500 killed in extreme weather events in India: IMD**

**Source:** [indiatoday.in](https://indiatoday.in), 5 January, 2021



**IMD said 12 of the 15 warmest years since 1901 were in the past one-and-a-half-decade (2006-2020).**

In yet another indication of warming global temperatures, the India Meteorological Department (IMD) has said the year 2020 was the eighth warmest year since 1901. Besides this, 12 of the 15 warmest years in this period were in the past one-and-a-half-decade (2006-2020), indicating that global temperature has been rising in the recent past.

The IMD however said that 2020 was "substantially lower" than the highest warming observed in 2016.

It said the past two decades -- 2001-2010 and 2011-2020 -- were also the warmest decades on record with anomalies of 0.23 degree Celsius and 0.34 degree Celsius, respectively.

Speaking about India, IMD said the country's averaged annual mean temperature during 1901-2020 showed an increasing trend of 0.62 degree C/100 years with significant increasing trend in maximum temperature (0.99 degree C/100 years) and relatively lower increasing trend (0.24 degree C/100 years) in minimum temperature.

"In 2020, annual mean land surface air temperature averaged over the country was 0.29 degree Celsius above normal (based on the data of 1981-2010). The year 2020 was the eighth warmest year on record since nationwide records commenced in 1901," the IMD said in a statement on Climate of India during 2020.

As per the statement, India's averaged mean monthly temperatures were also warmer than the normal during all the months of the year except March and June.

The mean temperatures exceeded the normal during September (by 0.72 degree C, warmest since 1901), August (by 0.58 degree C, second warmest), October (by 0.94 degree C, third warmest), July (by 0.56 degree C, fifth warmest), and December (by 0.39 degree C, seventh warmest).

The IMD said that the five warmest years on record were: 2016 (0.71 degree C), 2009 (0.55 degree C), 2017 (0.541 degree C), 2010 (0.539 degrees C), and 2015 (0.42 degree C).

Apart from this, the IMD said extreme weather conditions led to the death of more than 1,565 people last year with thunderstorm and lightning claiming the lives of 815 of them.

Cyclones killed 115 people and more than 17,000 livestock in India in 2020.

## **1.2 Explained: Why is North India feeling the heat? Is the winter over?**

**Source:** indianexpress.com, 24 February, 2021

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In the absence of cold wave and cold day conditions over the plains of north India, temperatures began to soar. Delhi, Dehradun and many locations in both the plains and the hills recorded significantly above normal day temperatures for this time of the year.

after continuous cold conditions experienced all through January and the beginning of February, the plains over North India reported a sharp shift in temperatures since last week. This has triggered apprehensions that the cold season is ending soon and the summers are going to start early.

### **How has the weather over North India been in 2021?**

Cold conditions dominated both the plains and hilly regions in North and Northwest India this season. Though the average monthly minimum temperature recorded over the country in January remained the warmest in 62 years, Delhi, Punjab, Haryana, Himachal Pradesh, Chandigarh and Jammu and Kashmir experienced prolonged severe cold conditions.

The national capital and neighbouring areas also reported sporadic rainfall in the first week of the new year.

However unlike the winter of 2020, not many cold day conditions were recorded during this season. In January, there were fewer and feeble western disturbances across lower latitudes.

“The effects of western disturbances were mostly limited to hilly regions in January,” said RK Jenamani, senior scientist at the National Weather Forecasting Centre, New Delhi.

### **Why has there been a sudden rise in temperatures?**

In the absence of cold wave and cold day conditions over the plains of north India, temperatures began to soar. Delhi, Dehradun and many locations in both the plains and the hills recorded significantly above normal day temperatures for this time of the year.

On February 11, New Delhi recorded 30.4 degrees Celsius, which was 7.7 degrees above normal (see box).





**Temperatures (in degree Celsius) over New Delhi (Safdarjung) during February 9 – 16, 2021**

“The dominance of the prevailing easterly waves and presence of multiple weather systems over Central India is preventing the cold waves from reaching the northern parts of India. That is why, temperatures have seen a sharp rise, with departures ranging between 5 to 7 degrees from normal,” said Jenamani.

**How will these weather systems affect the cold conditions?**

Due to the presence of multiple weather systems and their confluence with moist easterly winds expected over Central India during the next three days, thunderstorm is forecast over this region till February 19.

Madhya Pradesh, Chhattisgarh along with parts of Vidarbha, Marathwada, South Interior Karnataka, Jharkhand and Odisha will experience light intensity rainfall accompanied by lightning. Some parts of Maharashtra could see hailstorm during the next two to three days.

As a result, no significant cold conditions would prevail over the country, except Jammu and Kashmir till February 20.

**Is the winter season over?**

IMD identifies January and February as winter months over India. Even though the temperatures would remain on the higher side till February 20, the winter season is not over yet, the IMD officials said.

A fresh western disturbance is expected to cross extreme north India on February 20. This system will bring rainfall or snowfall over Jammu and Kashmir.

Once it passes, there is a marginal drop of around 2 to 3 degrees likely over Delhi, Punjab, Haryana, Chandigarh areas starting February 22 onwards. It would not be a very cold spell, but would be a respite from the present warm conditions.

With that, a gradual rise in minimum temperatures by 2 to 4 degree Celsius over North and Northwest India is expected after February 25. The day temperatures, too, shall soar in the coming days and remain between 22 to 30 degrees, except over Jammu and Kashmir, Shimla and places of higher altitudes.

### **1.3 Bhubaneswar records highest temperature in country**

**Source:** [newindianexpress.com](http://newindianexpress.com), 26 February, 2021



**Commuters cover themselves with a cloth to escape from sun in Bhubaneswar on Thursday**

The Met office has predicted clear sky conditions with maximum and minimum temperature hovering around 38 and 18 degree respectively in the city on Friday.

**BHUBANESWAR:** Bhubaneswar on Thursday was the hottest in the country as mercury shot to 39.4 degrees Celsius. The capital city reported the highest temperature for the second consecutive day. Baripada along with Khargone in Madhya Pradesh recorded the second-highest maximum temperature of 38 degrees Celsius. About 16 places in the State recorded 35 degrees or more on Thursday, according to India Meteorological Department (IMD).

The Capital city had recorded

38 degrees while Cuttack's day temperature stood at 36.6 degrees on Wednesday. Met office said maximum temperature is likely to remain 2 to 4 degrees above normal at many places in Odisha during the next four to five days.

“Bhubaneswar's highest temperature in February was recorded on in 1963 when the day temperature had touched 42.7 degree Celsius on February 23. The maximum temperature has witnessed a rise due to an anti-cyclonic circulation over Odisha and low moisture content in the atmosphere,” said Bhubaneswar Meteorological Centre Scientist Umasankar Das. Dry weather will prevail in the State till March 2, he added. The Met office has predicted clear sky conditions with maximum and minimum temperature hovering around 38 and 18 degree respectively in the city on Friday.

Private weather forecaster Skymet said Bhubaneswar recorded the highest maximum temperature in the country. “In fact, 38 degree Celsius maximum temperature mark has been breached for over four times in Bhubaneswar in the last decade. In 2012 and 2016, it was more than 40 degree,” said vice-president (meteorology and climate change) at Skymet Mahesh Palawat.

#### **1.4 Heat wave, hot days and warm nights over Delhi, Chandigarh, Haryana, UP: IMD**

**Source:** indianexpress.com,1 March,2021



**Kids enjoy a nice afternoon swim to get a respite from scorching summer heat at the canal near Janata Vasahat near Parvati.**

Day temperatures over Madhya Maharashtra, Marathwada and Vidarbha sub-divisions of Maharashtra, along with Telangana, Karnataka, Kerala and Tamil Nadu, however, are likely to remain anywhere about 0.5 degree below normal.

The MET department has said day temperatures over a majority of regions in the North, East, Northwest and central India would remain above normal during the summer.

In its 'Seasonal outlook for temperatures during March to May 2021' statement released on Monday, the India Meteorological Department (IMD) has said above normal maximum temperatures are expected mainly over Odisha and Jharkhand — more than 0.5 degree in comparison to the long period average (LPA).

“Haryana, Chandigarh, Delhi and Uttar Pradesh should particularly brace for events of heat waves, hotter days and warmer nights during March to May period, this year,” said Mrutyunjay Mohapatra, director general, IMD.

Besides, a hotter season is likely over Himachal Pradesh, Uttarakhand, Rajasthan, Gujarat, Kutch, Saurashtra, East Madhya Pradesh, Bihar, Assam, Sikkim, Nagaland, Manipur, Meghalaya, Mizoram and Arunachal Pradesh, along with Konkan and coastal Andhra Pradesh sub-divisions.

Day temperatures over Madhya Maharashtra, Marathwada and Vidarbha sub-divisions of Maharashtra, along with Telangana, Karnataka, Kerala and Tamil Nadu, however, are likely to remain anywhere about 0.5 degree below normal.

Minimum temperatures over most areas along central India, Karnataka, areas along foothills of the Himalayas, Sikkim and Jammu and Kashmir will remain normal, stated the IMD's seasonal outlook.

The Met department also said moderate intensity La Nina conditions are presently prevailing over central and equatorial Pacific Ocean. La Nina is the abnormal cooling of sea surface temperatures along the equatorial Pacific Ocean. This ocean phenomenon is known to influence monsoon and regulate global temperatures.

“The latest forecast indicates that La Nina conditions are likely to sustain during the upcoming hot weather season till May,” the statement read.



## **1.5 IMD Forecasts Heat Waves In Summer, These States To Witness Above Normal Temperature**

**Source:** outlookindia.com, 2 March, 2021

The India Meteorological Department (IMD) predicted the initial summer forecast for March to May on Monday. Here are the states that will experience the scorching heat.



**A man trying to ease himself due to the scorching heat**

Most parts of India are expected to witness the scorching summers after the India Meteorological Department (IMD) predicted the initial summer forecast for March-May on Monday. It said that the day temperatures are likely to be above normal in north, northeast, parts of east and west India. However, the people in the south and the adjoining central India are likely to experience drop in the normal temperatures.

The IMD said it will release the second summer forecast for April to June in April.

IMD Director General Mrutunjay Mohapatra said over the Indo-Gangetic plains -- from Punjab, Haryana, Chandigarh, Delhi, east UP, west UP, Chhattisgarh, Jharkhand to Odisha -- the temperature is expected to be above normal by more than 0.5 degree Celsius during March to May.



There is a probability forecast for above maximum temperatures in Chhattisgarh, Odisha, Gujarat, coastal Maharashtra, Goa and coastal Andhra Pradesh.

"During the upcoming hot weather season (March to May), above normal seasonal maximum (day) temperatures are likely over most of the subdivisions of north, northwest and northeast India, few subdivisions from eastern and western parts of central India and few coastal subdivisions of north peninsular India," the forecast said.

There is a high probability with more than 75 per cent of above normal temperature over Chhattisgarh and Odisha where mercury will be above normal. He said in these two states, temperature is likely to be above normal by 0.86 degree Celsius and 0.66 degree Celsius respectively.

"There is also a 60 per cent probability of above normal temperature over Haryana, Chandigarh and Delhi by 0.5 degree Celsius," he said.

There is likely to be some relief in parts of south India.

"Below normal seasonal maximum temperatures are likely over most of the subdivisions of south peninsula and adjoining central India," the summer forecast added.

It said above normal seasonal minimum (night) temperatures are likely over most of the of north India along the foot hills of Himalayas, northeast India, western part of central India and southern part of peninsular India.

"However, below normal season minimum temperatures are likely over most of the subdivisions of eastern part of the central India and few subdivisions of extreme northern part of the country," the IMD added.

The IMD added that moderate La Niña conditions are prevailing over the equatorial Pacific and sea surface temperatures (SSTs) are below normal over the central and eastern equatorial Pacific Ocean.

The latest model forecast indicates that La Niña conditions are likely to sustain during the upcoming hot weather season (March to May), it added.

La Nina is associated with the cooling of the Pacific waters and El Nino is its antithesis. The phenomenon has a impact on the weather of the Indian sub-continent.

The IMD last month had said the minimum temperature recorded in the country in January was the warmest for the month in 62 years. South India was particularly warm.

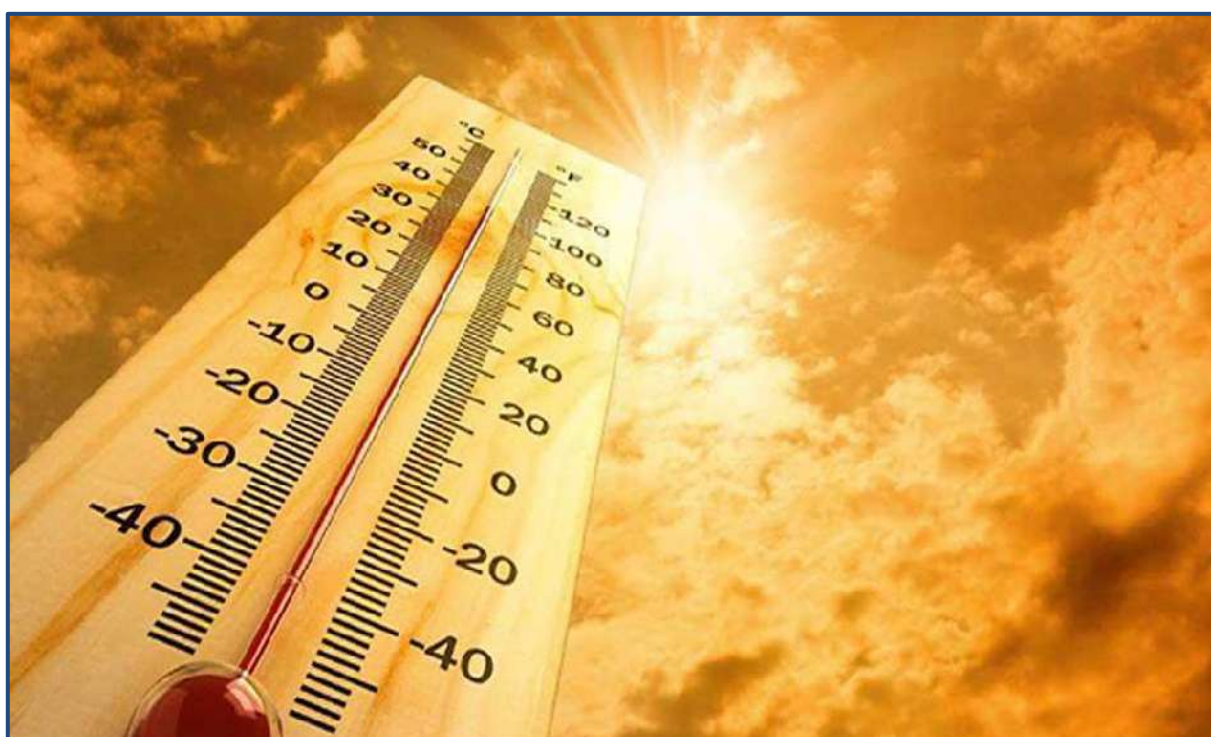
The month was the warmest in 121 years, with 22.33 degrees Celsius in south India, followed by 22.14 degrees Celsius in 1919 and 21.93 degrees Celsius in 2020 as the second and third warmest months.

Central India was also the warmest (14.82 degrees Celsius) in the last 38 years after 1982 (14.92 degrees Celsius), while 1958 with 15.06 degrees Celsius was the warmest in the 1901-2021 period.

## **1.6 Heat Waves In Telangana May Reach Above 45 Degrees In Summer**

**Source:** thehansindia.com,9 March,2021

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### **Appreciable fall in day temperatures in Telangana**

Heatwave In Telangana: People who have been suffering from cold for a long time are no longer ready to withstand the heat of the sun. The rise in temperatures is faced by people since last week. The heatwaves are starting at 7 in the morning. In addition to this, the intensity of winds has also increased. If this is the case at the beginning of the summer, people are afraid of what will happen in the months of April and May.

Generally, the heat waves enter the state during 'Shivaratri' times... But this year, in March itself, the heat waves started troubling the people. Summer will be even hotter this time when compared to the last year. Hyderabad is experiencing a high of 36.6 degrees Celsius in a single day. According to the

Meteorological Department officials, temperatures are expected to hover between 42 and 45 degrees this year, said. Heatwaves are expected to hit people badly. The city recorded a maximum temperature of 44.5 degrees for the last ten years. Meteorologists said the temperature is likely to rise by one degree this time. The months of April and May are most affected by the sun.

The meteorological department as well as the medical department are warning the people in advance in view of the rising temperatures. Do not come out unless absolutely necessary. Temperatures are high from 10 a.m. to 4 p.m., suggesting that it is best not to go outside at that time. It is clear that this year's temperatures will be higher compared to last year. Expert advice is to take appropriate precautions.

### **1.7 Heatwave in Gujarat's Saurashtra, Kutch; IMD issues yellow alert**

**Source:** hindustantimes.com, 18 March, 2021



**A severe heatwave is declared when the maximum temperature is at least 40°C and more than 6.4°C higher than the normal or when the maximum temperature is more than 47°C.**

The weather bureau has also issued a yellow alert over the Saurashtra and Kutch region.

Gujarat's Saurashtra and Kutch region will continue to reel under heatwave conditions till Thursday, the India Meteorological Department (IMD) has

said. The weather bureau has also said there won't be any significant change in maximum temperatures over most parts of Gujarat during the next 48 hours and it would fall by 2-3°C after that. "No heat wave very likely over the country during next 5 days except over Saurashtra & Kutch, where heat wave conditions in isolated places are very likely on 17th & 18th March," IMD said on Wednesday.

The weather bureau has also issued a yellow alert over the Saurashtra and Kutch region. "Heat is tolerable for the general public but moderate health concern for vulnerable people e.g. infants, elderly, people with chronic diseases," IMD said and added that people should avoid heat exposure.

The met department declares a heatwave when the maximum temperature is at least 40°C and between 4.5°C and 6.4°C higher than the normal or when the maximum temperature is over 45°C for two stations in a sub-division for two consecutive days.

It considers a severe heatwave when the maximum temperature is at least 40°C and more than 6.4°C higher than the normal or when the maximum temperature is more than 47°C.

IMD has issued a forecast of above-normal summers for north and east India which usually sees a high number of deaths due to heatwaves. In its summer forecast for March to May made earlier this month, IMD said day temperatures are likely to be above normal in north, northeast, parts of east and west India. "However, below normal seasonal maximum temperatures are likely over most of the subdivisions of the south peninsula and adjoining central India," it added.

It has said there is a probability forecast for above maximum temperatures in Chhattisgarh, Odisha, Gujarat, coastal Maharashtra, Goa and coastal Andhra Pradesh.

The IMD had said earlier this year that 2020 was the eighth warmest since 1901 but it was "substantially lower" than the highest warming observed in 2016. According to the weather department, the past two decades - 2001-2010 and 2011-2020 - were also the warmest decades on record with anomalies of 0.23 degree Celsius and 0.34 degree Celsius respectively, indicating the overall rising temperature.

## 1.8 Heat wave predicted in Andhra Pradesh, mercury to climb over 40°C

**Source:** timesofindia.indiatimes.com, 21 March, 2021



**VISAKHAPATNAM:** Several coastal districts in Andhra Pradesh are expected to experience heat waves over the next couple of days. Heat wave conditions are likely to prevail in coastal districts from Srikakulam to Guntur until March 22.

While 58 mandals across the state are expected to experience heat waves, four mandals are expected to be hit by severe heat waves with temperatures rising above 40°C. Bhamini in Srikakulam district is predicted to experience the highest temperature of around 43°C over the next two days.



According to a senior official of the Andhra Pradesh State Disaster Management Authority (APSDMA), nearly 22 meteorological regions in East Godavari have been marked red and yellow as warning of heat waves.



Temperatures will be more than 40°C, people should take precautionary measures, the official said.

India Meteorological Department (IMD) director for AP, S Stella, said that temperatures would increase gradually and dry weather conditions would prevail across the Rayalaseema region. This will cause rise in temperatures from the last week of this month, Stella told TOI while adding that temperatures would be 2–3°C above normal in coastal AP and around 2°C higher in other parts of the state.

Concerned district administrations have been asked to take adequate measures to prevent loss of life due to the weather. Newly-elected mayor of Greater Visakhapatnam Municipal Corporation (GVMC) Hari Venkata Kumari said, “We will take all precautionary measures in the city with a proper action plan.”

Vizianagaram’s Peediseela panchayat secretary Behara Ramya said, “We opened a water kiosk in our panchayat limits on Saturday keeping the heat wave conditions in mind.” Civic bodies have been asked to take all possible steps to prevent loss of lives due to the abnormal weather.

### **1.9 Parts of India to see deadly heat waves in coming decades: Study**

**Source:** [newindianexpress.com](http://newindianexpress.com), 25 March, 2021



**The heat wave raises concerns over global warming and, in particular, Europe's readiness for climate change.**

In 2015, large parts of India and Pakistan experienced the fifth deadliest heat wave in the recorded history, which caused about 3,500 heat-related deaths.

NEW YORK: Limiting warming to 1.5 degrees Celsius will likely reduce the impact of deadly heatwaves by half, but the heat waves will become commonplace across South Asia, including major crop-producing regions in India -- such as West Bengal and Uttar Pradesh, says a new study.

The findings, published in the journal *Geophysical Research Letters*, indicated that these deadly heat waves will likely become more commonplace in the coming decades even if global warming is limited to 1.5 degrees Celsius.

"Even at 1.5 degrees, South Asia will have serious consequences in terms of heat stress," said researcher Moetasim Ashfaq from the Oak Ridge National Laboratory in the US.

"The future looks bad for South Asia, but the worst can be avoided by containing warming to as low as possible," Ashfaq added.

The results differ from a similar study conducted in 2017, which predicted that heat waves of lethal temperatures will occur in South Asia toward the end of the 21st century, the researchers said.

The researchers suspect the earlier study is too conservative, as deadly heat waves have already hit the region in the past.

In 2015, large parts of India and Pakistan experienced the fifth deadliest heat wave in the recorded history, which caused about 3,500 heat-related deaths.

In the new study, the researchers used climate simulations and projections of future population growth to estimate the number of people who will experience dangerous levels of heat stress in South Asia at warming levels of 1.5 and 2 degrees Celsius.

They estimated the wet-bulb temperature residents will experience, which is similar to the heat index, as it takes into account humidity as well as temperature.

A wet-bulb temperature of 32 degrees Celsius (89.6 degrees Fahrenheit) is considered to be the point when labour becomes unsafe, and 35 degrees Celsius (95 degrees Fahrenheit) is the limit to human survivability -- when the body can no longer cool itself.

Their analysis suggests at 2 degrees of warming, the population's exposure to unsafe labour temperatures will rise more than two-fold, and exposure to lethal temperatures rises 2.7 times, as compared to recent years.

"The future looks bad for South Asia, but the worst can be avoided by containing warming to as low as possible," Ashfaq added.

### 1.10 Pune sizzles at 40.1°C first time this summer

**Source:** timesofindia.indiatimes.com,30 March,2021



**Boys jump into a canal near Janata Vasahat on Monday afternoon**

PUNE: The maximum temperature touched 40 degrees celsius for the first time this summer in the city after hot winds from north India sent the mercury up in the rest of the state too.

Shivajinagar recorded 39.3 degrees celsius as the day temperature on Monday while

Lohegaon was a sizzling 40.1 degrees celsius. Both were two to three degrees above the normal.

North India has been heating up significantly and those hot winds have swept over parts of central India and Maharashtra, Skymet Weather Services president G P Sharma told TOI on Monday.

"Delhi recorded a high day temperature of 40.1 degrees C on Monday, its highest March day temperature since 2005. Winds from the north tend to flow into central India and parts of Maharashtra, increasing temperatures. Gujarat is also recording near heat-wave conditions. Thus, the impact of a hot northwest India can also spill over to Maharashtra. Temperatures are on the higher side in several parts of the country since the last three days. Heat conditions are above normal this time during March in many parts of the country in comparison to the last few years," he added.

However, temperatures may come down slightly after the next couple of days, but a rise in the mercury across several parts of India is likely to recur soon.

“Changes in the wind pattern, influenced by western disturbances up north will cause the mercury to fluctuate every few days,” Sharma said.

All locations in Maharashtra are currently recording high day temperatures, significantly above the normal in some parts. In fact, the maximum temperatures are 3-5 degrees celsius above the normal in Vidarbha which is on a heat-wave alert.

IMD on Monday had forecast heat-wave conditions in some pockets with severe heat-wave conditions in isolated pockets over West Rajasthan and heat-wave conditions in isolated pockets over Himachal Pradesh on Monday, East Rajasthan, Saurashtra, Kutch and Madhya Pradesh on Monday and Tuesday and Vidarbha on Tuesday.

An IMD official told TOI, “Parts of Rajasthan are recording positive day temperature departures in the range of 6-7 degrees celsius, with a similar trend in Delhi on Monday where the maximum temperature was above the normal by 8 degrees. Winds from north India to Maharashtra have been heating up the state. However, we have not reported a heat-wave condition in parts of the state, though Vidarbha is on alert.”

### **1.11 Heat wave conditions likely at isolated pockets in Tamil Nadu, Puducherry for 5 days: IMD**

**Source:** indianexpress.com, 31 march, 2021

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The public, party candidates, farmers, traffic police have been requested to avoid working, conducting rallies out in the open between 12- 4 pm.

Heat wave conditions are likely to prevail over isolated pockets in Tamil Nadu and Puducherry for the next five days, the Indian Meteorological Department (IMD) said Wednesday.

The rise in temperature will be felt in Chennai, Kancheepuram, Chengalpet, Vellore, Ranipet, Tirupathur, Thiruvallur, Tiruvannamalai, Villupuram, Cuddalore, Salem, Dharmapuri, Krishnagiri, Kallakurichi, Namakkal, Karur, Tiruchirapalli, Perambalur, Ariyalur, Mayiladuthurai, Puducherry and Karaikal.



**As per the forecast, since the dry land breeze from north-west is moving towards Tamil Nadu, the temperature may increase 3-5 degree Celsius between March 31 – April 4.**

“For next 48 hours, the sky condition is likely to be mainly clear. Maximum and minimum temperature will be around 39 °C and 28 °C respectively,” the release from IMD read. Further, public, party candidates, farmers, traffic police have been requested to avoid working, conducting rallies out in the open between 12- 4 pm. On Tuesday, Chennai recorded temperatures above 40 degree Celsius. According to private weather blogger Pradeep John popularly known as the Tamil Nadu Weatherman, Meenambakkam recorded 41.3 degree Celsius, breaking the record for the highest temperature for the month of March.

Similarly, he said Tiruchirapalli recorded 40.8 degree Celsius on Tuesday, it's hottest day in March in over 50 years.

### **1.12 Heatwave conditions likely in parts of Rajasthan for next 48 hours: Met dept**

**Source:** hindustantimes.com,2 April,2021

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The met office has issued a yellow alert for Saturday and Sunday in some districts of the state including Kota, Barmer, Jaisalmer, Jodhpur, and Jalore.

Several parts of Rajasthan are likely to experience heat wave conditions over the next 48 hours with a rise in maximum temperatures, the meteorological department here said on Friday.



**Director of meteorological centre, Radheshyam Sharma said at present, the maximum temperature in most places is below 40 degrees Celsius.**

The met office has issued a yellow alert for Saturday and Sunday in some districts of the state including Kota, Barmer, Jaisalmer, Jodhpur, and Jalore.

Director of meteorological centre, Radheshyam Sharma said at present, the maximum temperature in most places is below 40 degrees Celsius but the mercury will rise by two to three degrees Celsius in the next two-three days.

He said a new western disturbance will be active on April 5 and 6 in the districts of Jaisalmer, Nagaur, Jodhpur, Bikaner, Hanumangarh, Ganganagar and Churu.

Due to this, duststorms with a wind speed of up to 30-40 km per hour are likely to occur in Jodhpur and Bikaner divisions, Sharma said.

However, there is a possibility of drizzle or light rain in both the district on April 6 accompanied by gusty winds with speed reaching 40 to 50 km per hour, he said.



### **1.13 Heatwave predicted in Telangana for 2 days, people advised not to be out between 12-3 pm**

**Source:** thenewsminute.com,3 April,2021

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According to the IMD, the heat is tolerable for the general public but is a health concern for infants and people with chronic diseases.

The India Meteorological Department's Hyderabad centre has issued an impact-based heatwave forecast for Telangana in which heatwave conditions are predicted to continue in several parts of the state. The IMD has said the temperatures are very likely to be around 40°C – 43°C.

According to the IMD, heatwave conditions are very likely to occur in the following districts: Mancherial, Peddapalli, Jayashankar Bhupalpally, Mulugu, Bhadradi Kothagudem, Khammam, Nalgonda, Suryapet, Mahabubnagar, Nagarkurnool Wanaparthi, Jogulamba Gadwal and Narayanpet of Telangana.

A yellow alert has been given for Saturday and Sunday. According to the IMD, the heat is tolerable for the general public but is a health concern for infants and people with chronic diseases.

They have advised people not to venture out between 12 pm and 3 pm. They have also urged people to keep themselves hydrated to avoid dehydration.

Bhadrachalam has recorded a maximum temperature in the state of 42.6°C on Saturday. The forecast for the coming week says that temperatures are expected to be 2-3°C above normal on April 5 and 6.

The yellow alert is a heat alert meant to warn people. If the temperatures increase, then an orange alert will be sounded to ask people to be prepared. A red alert will be issued in the case of extreme heat in the case of a severe heat wave condition. Telangana is highly vulnerable to heatwaves owing to its geographic and topographical context, as it is located in India's core heatwave zone. The Telangana government has formulated a heatwave action plan to ensure the number of fatalities due to the heat wave is minimal, for which various departments of the government are coordinating.

### **1.14 Heat wave unlikely in Delhi for another week: India Meteorological Dept**

**Source:** business-standard.com, 5 April, 2021



The maximum temperature crossed the 40 degrees Celsius-mark in parts of Delhi on Monday, but a heat wave is "unlikely" for another week, the India Meteorological Department (IMD) said.

The maximum temperature crossed the 40 degrees Celsius-mark in parts of Delhi on Monday, but a heat wave is "unlikely" for another week, the India Meteorological Department (IMD) said.

The Safdarjung Observatory, which provides representative data for the city, recorded a maximum of 38.8 degrees Celsius, four notches above normal.

The minimum temperature settled at 18.5 degrees Celsius, normal for this time of year, the IMD said.

The weather stations at Najafgarh, Narela and Pitampura recorded a maximum of 40 degrees Celsius, 40.3 degrees Celsius and 40.1 degrees Celsius, respectively.

Kuldeep Srivastava, the head of the regional forecasting centre of the IMD, said Delhi is unlikely to witness a heat wave till April 11-12.

"The temperature is likely to rise on Tuesday. However, it will drop again (by two to three degrees) in the coming days," he said.

For the plains, a "heat wave" is declared when the maximum temperature is more than 40 degrees Celsius, and at least 4.5 notches above normal.

A "severe" heat wave is declared if departure from normal temperature is more than 6.5 degrees Celsius, according to the IMD.

### **1.15 Heat wave, scanty rains in Palakkad**

**Source:** timesofindia.indiatimes.com, 7 April, 2021

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Palakkad: The atmospheric temperature continues to rise in the district, resulting in a heat wave as summer rain is scanty.

The summer this time started with a bang in the district when Mundur recorded 41°C for the first time this summer on February 28 and it rose to 41.5°C on April 2 and 41°C on April 3. The minimum temperature was 27°C. Mundur IRTC recorded 39°C on Monday.

Malampuzha recorded 38.4°C on Monday, and on Tuesday maximum temperature of 37.8°C and 26.5°C minimum. According to India Meteorological Department (IMD), the average temperature recorded in Palakkad on March 18, 2021 was a record 41°C.

The scant cloud cover and the absence of rain may continue to push the mercury levels by 7°C above normal. The normal temperature is 33°C. But Palakkad has been sweltering since the second week of February, with temperatures 2 to 3°C above normal, IMD officials said. The health



department has warned about possible sun burns in the district. People are advised not to work or travel in the open sun between 11am to 3pm. Malampuzha dam shutters to be opened

The shutters of Malampuzha reservoir will have to be opened to release water to Bharathapuzha to save water in its check dams which are the sources of many drinking water supply schemes of Kerala Water Authority (KWA) for Palakkad, Malappuram and Thrissur districts.

Water shortage in Thrissur district is already felt in areas like Thiruvilwamala and Chelakkara areas due to the drying up of Bharathapuzha. The water level of Malampuzha stood at 104.21m on Monday as against the 104.09m of last year on this day, said officials at the office of the executive engineer of Malampuzha irrigation project.

### **1.16 Madhya Pradesh In for Heatwave-Thunderstorm Double Whammy from April 8-12; Yellow Alert Issued Over Multiple Districts**

**Source:** weather.com,8 April,2021



**A lightning strike captured in Bhopal, Madhya Pradesh**

Thursday, April 8: The state of Madhya Pradesh is in for a tumultuous end to this week, as the Central Indian state is in for a double-whammy of heatwaves and thunderstorms over the next four days, i.e. April 8-12.

According to the India Meteorological Department (IMD), the eastern half of Madhya Pradesh and the adjoining state of Jharkhand are both expected to endure heatwave conditions in isolated pockets over the next 24 hours.

The heatwave will be particularly likely at many places within the districts of Satna, Chhatarpur and Tikamgarh in Madhya Pradesh on Thursday, as per the IMD's regional met centre in Bhopal.

The IMD declares a heatwave when the local temperature is expected to cross 40°C and simultaneously rise 5°C to 6°C above the region's normal temperature.

Amid such conditions, dehydration, heat cramps, heat exhaustion and heat strokes are all genuine possibilities, and therefore, residents of the region—especially children, the elderly and those with pre-existing morbidities—must avoid venturing outdoors during the afternoon hours.

Some respite from the scorching heat may arrive immediately, as a day later, come Friday, parts of Madhya Pradesh and its adjoining state of Chhattisgarh will welcome isolated to scattered rains, thunderstorms, lightning and gusty winds that could reach the speed of 30-40 kmph. These wet conditions could last until the start of next week.

IMD Bhopal has particularly highlighted the possibility of thunderstorms across the districts of Umariya, Annupur, Shahdol, Dindori, Chhindwara, Balaghat, Seoni, Mandla, Betul and Harda districts between Friday and Sunday.

A yellow watch has also been issued over the aforementioned districts, so as to urge the residents to 'be aware' of the local weather situation.

Bhopal, the state capital, will remain mostly sunny for the next two days, and partly cloudy over the weekend, as per The Weather Channel's 10-day forecast.

The probability of rainfall over the City of Lakes will remain below 10%, while the daytime mercury levels are expected to hit 39°C.

Apart from Madhya Pradesh, its neighbouring states of Maharashtra and Chhattisgarh, along with the adjoining East Indian states of Jharkhand, Bihar, Odisha and Gangetic West Bengal will all experience rains and thunderstorms starting Friday.

The wet weather over East and Northeast India will be caused by a trough in westerlies, which will be strengthened by the incursion of moisture from the Bay of Bengal.



Meanwhile, since the beginning of the pre-monsoon season on March 1, the state of Madhya Pradesh has recorded 'normal' rainfall at 7.7 mm, just 2% below its long-term average for the period between March 1 and April 7.

In the same time frame, the Western MP subdivision has registered 'large excess' precipitation at 8.3 mm, whereas Eastern MP has recorded 'deficit' rains at 6.9 mm.

### **1.17 Gujarat, West Bengal, Odisha to Endure Heatwave on April 27, Followed by Thunderstorms from April 28-May 1**

**Source:** weather.com, 27 April, 2021

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**A resident of Ahmedabad, Gujarat uses an umbrella to protect herself from the scorching heat.**

Tuesday, April 27: Parts of Eastern and Western India are set to experience heatwave conditions on Tuesday, April 27, which will be followed by some thunderstorm activity from April 28 to May 1.

According to the India Meteorological Department (IMD), isolated pockets of Gujarat, Odisha and Gangetic West Bengal could endure heatwave conditions on Tuesday, April 27.

Within the eastern states, the heatwave conditions will prevail at one or two places in Odisha, as well as North & South 24 Parganas, Howrah, East &

West Midnapore, and Jhargram districts of Gangetic West Bengal, as per the regional met centre in Kolkata.

The IMD declares a heatwave when the local temperature is expected to cross 40°C and simultaneously rise 5°C to 6°C above the region's normal temperature.

Amid such conditions, dehydration, heat cramps, heat exhaustion and heat strokes are all genuine possibilities, and therefore, residents of the region—especially children, the elderly and those with pre-existing morbidities—must avoid venturing outdoors during the afternoon hours.

In view of these predictions, the IMD has issued a yellow watch over Gujarat (both Saurashtra-Kutch and Gujarat region subdivisions), Gangetic West Bengal, and Odisha on Tuesday. The watch urges residents to 'be aware' of the local weather situation.

Thereafter, from Wednesday to Saturday, isolated thunderstorms have been forecast over these three states and their adjoining regions, due to which they will retain the yellow-level advisories.

Thunderstorms are often linked with warm temperatures, as they form when warm, moist air rises into cold air. The warm air becomes cooler, which causes moisture (water vapour) to form small water droplets through a process we call condensation. The cooled air then drops lower in the atmosphere, warms, and rises again; when this circuit of rising and falling occurs with large amounts of air and moisture, it creates thunderstorms.

Within Gujarat, the districts of Banaskantha, Patan, Junagadh, Amreli, Gir Somnath and Kutch are particularly vulnerable to thunderstorms, as per IMD Ahmedabad.

As for the east, thunderstorms with lightning and gusty winds (speed reaching 30-40 kmph) are on the horizon over at one or two places over Odisha, Sikkim, Darjeeling & Kalimpong districts of Sub-Himalayan West Bengal and Jhargram, East & West Midnapore, South 24 Parganas districts of Gangetic West Bengal. The states of Jharkhand and Bihar may also witness similar weather patterns starting Thursday, April 29.

Meanwhile, The Weather Channel's met team has also indicated that the maximum temperatures will be 40°C or higher over North India, while also spiking higher than normal across the Western Himalayan Region and Northeast India for the next five days.

Therefore, with scorching conditions and thunderstorm activity on the horizon, coupled with the ongoing threat of COVID-19 across the country, it is advisable to remain indoors in order to ensure complete safety.

### **1.18 Delhi: Mercury to touch 40°C, but heatwave unlikely this May**

**Source:** timesofindia.indiatimes.com, 27 May, 2021



**As the temperature in Delhi is expected to remain low in the remaining days of the month, there are less chances of heatwave.**

NEW DELHI: While the maximum temperature is likely to remain 40 degrees Celsius or below till month-end, this May is likely to see no heatwave day.

Due to five western disturbances and the impact of Cyclone Tauktae that resulted in highest ever rainfall on a day, the day temperature never

reached 42 degrees Celsius. In May last year, four heat waves were recorded. A heatwave is declared when the maximum temperature is 45 degrees Celsius or above or when the maximum temperature is at least 4.5 degrees above normal. The normal temperature around this time of the month is 40.4 degrees Celsius. As Cyclone Yaas and a western disturbance are likely to impact the region in the remaining days of the month, the day temperature is expected to hover around 38-39 degrees Celsius.

According to India Meteorological Department's data, the highest maximum temperature in May so far was recorded at 41.5 degrees Celsius on May 2. In 2020, the highest temperature reported on a day in May was 46 degrees Celsius. Kuldeep Srivastava, scientist at IMD and head, Regional Weather Forecasting Centre, said, "No heatwave has been reported this month so far. As the temperature is expected to remain low in the remaining days of the month, there are less chances of heatwave. The temperatures mostly remained below normal due to the influence of five western disturbances

that caused cloudy skies and rain. Cyclone Tauktae also caused Delhi to break the all-time record of highest rainfall in a day in May.” Last week, Safdarjung, Delhi’s base station, recorded 119.3mm of rainfall between 8.30 am on May 19 and 8.30 am on May 20. It was the highest rainfall recorded in 24-hour in May due to the impact of Cyclone Tauktae. The previous highest for a single day in May was 60mm, recorded all the way back in 1976. On Wednesday, the maximum temperature was recorded at 39.5 degrees Celsius, one degree below normal while the minimum temperature stood at 22.6 degrees Celsius, four notches below normal.

“The maximum temperature may rise slightly to 40 degrees Celsius on Thursday, but it may hover around 38-39 degrees Celsius from May 28 to 31. The temperature is predicted to dip on Friday as the wind direction would change to easterly under the influence of Cyclone Yaas. The temperature is unlikely to rise because a western disturbance may impact the region by month-end,” said a Met official.

### **1.19 Heat waves on the rise in India, Andhra Pradesh worst-hit**

**Source:** [newindianexpress.com](http://newindianexpress.com), 28 May, 2021

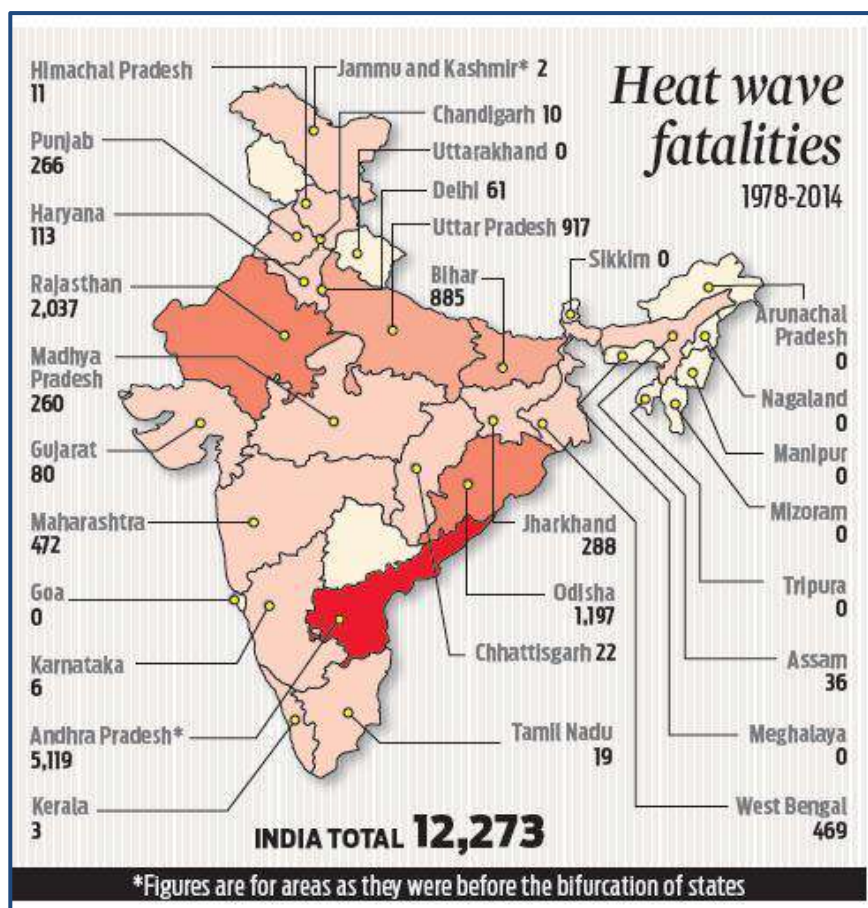


Heat waves with highest tolls		
Spells	States	Fatalities
15 May-22 June 2003	AP	1,300
9-15 May 2002	AP	600
1-31 May 1998	AP	355
20-30 May 1998	Odisha	340
6-16 May 1988	Rajasthan	337

Each event has resulted in about 104 fatalities in Andhra Pradesh with majority of them having been witnessed in April, May and June months.

NEW DELHI: Heat wave events have been gradually increasing in the country in the last three decades with 660 such events causing 12,273 fatalities, said a research paper.

"The heat wave events have shown a rising trend, whereas no significant rising or declining trend was observed in the heat wave. In fatality density, top five states are Chandigarh, Delhi, Andhra Pradesh, Bihar and Odisha. Regionally, annual fatality rate has varied from 0.66 (peninsula region) to 0.02 (hilly region)," said the paper published in Current Science.



The research used Disastrous Weather Events reports' statistics for the period 1978-2014. The analysis shows that only five states -- Andhra Pradesh (42 per cent), Rajasthan (17 per cent), Odisha (10 per cent), Uttar Pradesh (7 per cent) and Bihar (7 per cent) have accounted more than 80 per cent of the heat wave fatalities, although nine states namely, Arunachal Pradesh,

Nagaland, Manipur, Meghalaya, Tripura, Sikkim, Mizoram, Uttarakhand and Goa have never reported heat wave events.

Each event has resulted in about 104 fatalities in Andhra Pradesh. Majority of events have been witnessed in April, May and June months. The maximum count of events has been observed in Maharashtra state followed by Rajasthan, Odisha, West Bengal, Punjab and Andhra Pradesh.

Region wise analysis shows that the maximum count of heat wave events has been detected in northwest (30 per cent) followed by central northeast (28 per cent) and central west (19 per cent) regions, whereas least over hilly (1 per cent).



Conversely, peninsula has experienced roughly 42 per cent of the total fatalities followed by central northeast (27 per cent) and northwest (21 per cent) regions, while hilly region accounts almost negligible fatalities followed by northeast (4 per cent) and central west (6 per cent). Remarkably, the peninsula observed the highest fatalities per event (77 fatalities).

Andhra Pradesh has the maximum fatality rate per million population per year followed by Rajasthan, Odisha, Chandigarh and Punjab state. Fatality rate varies from 0.66 (peninsula) to 0.02 (hilly region) per year.

## **1.20 Heatwave over Rajasthan, marginal relief next week**

**Source:** skymetweather.com,29 May,2021

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Heatwave conditions are prevailing over Rajasthan and the mercury is shooting beyond 45degree at many places. The highest temperatures of this pre monsoon season are recorded over West and North Rajasthan covering Ganganagar, Hanumangarh, Anupgarh, Suratgarh, Churu, Jaisalmer, Barmer, Phalodi. and Bikaner.

The highest temperature in the region and also over the Indian landmass of 47.3 degrees Celsius was recorded at Ganganagar yesterday. Close behind were some other stations: Churu-46.6, Bikaner- 46.4, Jaisalmer 44.6, Barmer-43.5degree celsius. This surge of the blaze is expected to continue for the next 72 hours and a mild relief thereafter.

May end as such is expected to soar with the mercury rising beyond 45 degrees frequently. Break-in heatwave conditions come with some dust

storms and thunderstorm activity. Rainfall over the state and particularly for West Rajasthan is sporadic around this time. Remnant of cyclone Tauktae, as a depression, drenched most pockets, more so for the eastern half.

The moisture in the soil and humidity in the air left behind the cyclone triggered rains have been absorbed. The arid heat has returned and mercury is rising above normal. The heat also is getting advected from across the border where sweltering mercury is raising the bar beyond 45 degrees Celsius at many locations.

Extreme heat over Rajasthan is expected for the next 3 days. A western disturbance over the hills with a cyclonic circulation over Rajasthan is likely to come up on 02nd June. Reversal of wind pattern will result in light to moderate showers at few places over north and northeastern parts of Rajasthan.

Western parts of Rajasthan may not have any significant weather activity in terms of precipitation. However change of winds and proximity to moisture laden clouds and rains over the northern half of the state may provide little relief from the excruciating heat over the region.

### **1.21 Heat wave hits entire north India, temperature crossed 40 degrees celsius in many states**

**Source:** [english.newstracklive.com](https://www.newstracklive.com), 7 June, 2021

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**New Delhi:** The whole of North India is in a worse state due to the heat. The temperature has reached around 40 degrees in many areas. The situation is more or less the same everywhere in Delhi, Uttar Pradesh, Haryana and Bihar. The weather was pleasant in some states due to the recent cyclone, but as soon as its impact is over the heat is prevalent in these states.

Now even at night people can't get relief from the heat. The heat in Delhi on Sunday caused a lot of trouble to the people. The relief was that the maximum temperature was recorded at 38.1 degrees Celsius, two degrees below average.

The maximum temperature is currently likely to be close to 40 degrees Celsius and the minimum temperature is likely to be close to 26 degrees Celsius. The Met department said light rain may occur at isolated places on Monday and the temperature is expected to drop from Saturday.



The day temperature in Patna is currently approaching 40 degrees. Similar is the case in all the districts of the state and patna is unlikely to get heat relief in the coming days. But according to the Met department, the weather conditions here may change from June 12. According to the department, the monsoon may hit here around June 15, after which the weather may be pleasant due to the drop in temperature.

## **1.22 Heat waves rise in India as climate change intensifies**

**Source:** [phys.org](https://phys.org), 11 June, 2021

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"India, a tropical country, experiences severe heat wave conditions owing to its unique geographical and climatic setup," says Omvir Singh, professor of geography at the Kurukshetra University in India and a lead author of the study. "When global extreme temperature-related fatalities are examined, India is seen as the most severely affected country."

Heat waves accompanied by humidity pose a major threat to human life in India. A study published earlier this year in the Quarterly Journal of the Royal Meteorological Society says deadly Indian heatwaves are increasing in recent years and attributed it to the amplification of Arctic warming.

K. Sahadevan, an environmentalist and member of the South Asian People's Action on Climate Change, a regional coalition of individuals and organizations, says that heat waves account for approximately 90 percent of the total extreme temperature events related fatalities in the region.



**Dry land in Ladakh in India. A new study says that heat waves linked to global**

"Heat waves affect the socio-economic life of people and lead to crop failures and wildfires that affect food security," Sahadevan tells SciDev.Net. "Greater efforts are needed to understand the large-scale environmental factors that generate heat wave conditions to reduce impacts."

M.K. Prasad, former member of the UN's Millennium Ecosystem Assessment Board, says that as global carbon dioxide emissions continue to rise, heat waves are likely to become more frequent and more intense.

The study also observed noticeable variation in the count of male fatalities over women and children which they attributed to greater exposure outdoors.

"Individuals employed in outdoor activities, who are socially cut off and economically deprived, are exceedingly susceptible to causality in severe heat wave disaster," says Preeti Malik, an author of the study.

The Indian government does not recognize heat waves as potential threat to human lives. The National Disaster Management Act and the National Policy on Disaster Management do not include heat wave fatalities in their list of natural calamities and so no budgetary allocation is made to address the problem.



## **1.23 At 43 Degrees, Delhi Witnesses First Heat Wave This Year**

**Source:** [ndtv.com](https://www.ndtv.com), 29 June, 2021

The India Meteorological Department said the increase in the maximum temperature this time can be attributed to the delay in the arrival of the monsoon.



**Westerly winds have been blocking the advance of monsoon season into Delhi.**

New Delhi: Delhi witnessed the first severe heat wave of the year today with the maximum temperature at Safdarjung Observatory, considered the official marker for the city, rising to 43 degrees Celsius, the highest this year so far. A severe heat wave was witnessed in Lodhi Road, Ridge and Pusa areas, where the mercury soared to 42.6 degrees Celsius, 43.4 degrees Celsius and 44.3 degrees Celsius, respectively, seven notches above the average temperature. Najafgarh (44.4 degrees Celsius), Pitampura (44.3 degrees Celsius) and Mungeshpur (44.3 degrees Celsius) also reeled under a severe heat wave.

For the plains, a "heat wave" is declared when the maximum temperature is more than 40 degrees Celsius, and at least 4.5 notches above normal.

A "severe" heat wave is declared if departure from normal temperature is more than 6.5 degrees Celsius, according to the India Meteorological



Department (IMD). "Usually, the capital witnesses heat waves till June 20. The increase in the maximum temperature this time can be attributed to the delay in the arrival of the monsoon," Kuldeep Srivastava, the head of the IMD's regional forecasting centre, said.

There has been no rainfall in the last three days and warm westerly winds are blowing across a major part of northwest India, which has not been covered by the monsoon yet, he said. A heat wave is predicted in the capital on Wednesday, too.

According to the IMD, the southwest monsoon has reached Barmer in west Rajasthan, one of its last outposts, two weeks before its normal schedule but is yet to arrive in the north Indian plains including Delhi.

The northern limit of southwest monsoon (NLM) continues to pass through Barmer, Bhilwara, Dholpur, Aligarh, Meerut, Ambala and Amritsar, it said.

After arriving two days late in Kerala, the monsoon had raced across the country, covering eastern, central and adjoining northwest India seven to 10 days earlier than normal.

The meteorological office had earlier predicted that the wind system may reach Delhi by June 15, which would have been 12 days early. However, westerly winds have been blocking its advance into Delhi, parts of Uttar Pradesh, Rajasthan, Punjab and Haryana.

Normally, monsoon reaches Delhi by June 27 and covers the entire country by July 8. Last year, the wind system had reached Delhi on June 25 and covered the entire country by June 29.

However, this year, the wait for Delhi, Haryana, parts of west Uttar Pradesh, Punjab and west Rajasthan has been overdue even as the mercury and humidity have continued to soar, the IMD said, adding immediate relief was unlikely.

"Prevailing meteorological conditions, large scale atmospheric features and the forecast wind pattern by dynamical models suggest that no favourable conditions are likely to develop for further advance of southwest monsoon into remaining parts of Rajasthan, west Uttar Pradesh, Haryana, Chandigarh and Delhi and Punjab during the next six to seven days," the IMD said.

## **2. Heavy Precipitation Causing Floods and Landslides**

**Heavy precipitation** refers to instances during which the amount of rain or snow experienced in a location substantially exceeds what is normal. What constitutes a period of heavy precipitation varies according to location and season. Climate change can affect the intensity and frequency of precipitation. Warmer oceans increase the amount of water that evaporates into the air. When more moisture-laden air moves over land or converges into a storm system, it can produce more intense precipitation—for example, heavier rain and snow storms.

**Floods** are the most frequent type of natural disaster and occur when an overflow of water submerges land that is usually dry. Floods are often caused by heavy rainfall, rapid snowmelt or a storm surge from a tropical cyclone or tsunami in coastal areas.

**Landslides** are caused by disturbances in the natural stability of a slope. They can accompany heavy rains or follow droughts, earthquakes, or volcanic eruptions.

**Adverse impacts of these water-induced disasters are :**

- The potential impacts of heavy precipitation include crop damage, soil erosion, and an increase in flood risk due to heavy rains which in turn can lead to injuries, drownings, and other flooding-related effects on health.
- In addition to flooding, heavy precipitation also increases the risk of landslides. When above-normal precipitation raises the water table and saturates the ground, slopes can lose their stability, causing a landslide.
- Loss of lives, damage to property, and loss of crops and arable land are some of the common effects of landslides and floods. Once floods and landslides sweep across human settlements, affected families turn homeless.

### **2.1 Mumbai rains: Roads flooded, public transport hit as heavy showers pound city**

**Source:** mid-day.com,9 June,2021

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Monsoon arrived in Mumbai with heavy rains lashing the city and suburbs since early Wednesday morning, causing water-logging at many areas and disrupting local train services.



### **Heavy rains lashed over Mumbai on Wednesday**

The India Meteorological Department (IMD) issued a "red alert" for Mumbai, and neighbouring Thane, Palghar and Raigad districts, warning of very heavy to extremely heavy rainfall at isolated places there. The heavy downpour caused water-logging in various parts of the city, prompting the traffic police to shut four subways and forcing motorists to abandon their vehicles on roads. The heavy downpour also disrupted local train services, which are running only for personnel engaged in health and other essential services, and are out of bound for general commuters in view of the Covid-19 pandemic. While there were fewer vehicles on the city roads amid the downpour, motorcyclists and other two-wheeler riders were unable to manoeuvre their vehicles at some of the flooded places.

The traffic police closed Milan, Khar, Andheri and Malad subways for motorists due to water-logging at these places. "We have closed the subways due to water-logging of up to two feet at these junctions. However, traffic is smooth on the SV Road, Linking Road and the Western Express Highway. So far, no traffic congestion has been reported," Deputy Commissioner of Police (Traffic), Western Suburbs, Somnath Gcharge told PTI.

Heavy rains caused low visibility and increased the risk of accidents, hence the traffic police personnel are on roads to prevent such incidents, the official said. Cranes were used to clear roads on which motorists had abandoned their vehicles due to water-logging, he added. The city police appealed to Mumbaikars not to step out of their homes unnecessarily and cautioned them against travelling to some of the inundated areas. Mumbai

and its suburbs experienced thunderstorms along with moderate to intense spells of rainfall during the day, it added.

Suburban train services from Mumbai's Chhatrapati Shivaji Maharaj Terminus (CSMT) to neighbouring Thane and Vashi in Navi Mumbai were suspended due to water-logging on tracks, officials said. Routes of some BEST buses, run by the city civic body's transport wing, were diverted to avoid flooded streets, they said. According to the IMD, the western suburb of Santacruz recorded 164.8 mm rain in six hours from 8.30 am to 2.30 pm, while Colaba in south Mumbai recorded 32.2 mm rain during the same period. "It's monsoon arrival in Mumbai today," Dr Jayanta Sarkar, head of the India Meteorological Department's (IMD) Mumbai office, said in the morning. Speaking to mid-day, an IMD official said, "As per our forecast, the city won't experience heavy rainfall on Thursday even though an Orange alert has been issued for the next four days. However, from Friday onwards, there will be extremely heavy rainfall." The official further explained, "The monsoon has arrived early due to the presence of favorable conditions that are prevailing, like Southwesterly winds and upper air atmosphere, combined with rainfall. These conditions have been met which is why the monsoon has arrived two days early"

## **2.2 Maharashtra rains: Red alert in Raigad; over 1,000 people shifted to safer places**

**Source:** timesofindia.indiatimes.com, 10 June, 2021



**Heavy rains on Wednesday caused heavy flooding in Mumbai causing traffic jams. In view of the heavy downpour in Maharashtra, the Raigad district issued a red alert**

RAIGAD: A red alert has been sounded in Raigad district of Maharashtra, warning of heavy to extremely rainfall till Friday, prompting the district administration to shift over 1,000 people from 20 villages to safer places.

The district received an

average rainfall of 58 mm in the last 24 hours, Collector Nidhi Choudhary said in a release.

She said in view of the prediction of heavy downpour, a red alert has been issued in the district for Thursday and Friday and an orange alert for June 12 and 13.

Since there is a risk of landslides due to heavy rains, 1,139 people from 20 villages have been shifted to safer places, she said.

The India Meteorological Department (IMD) had on Saturday confirmed the arrival of the southwest monsoon in Maharashtra at Harnai in the coastal Ratnagiri district.

### **2.3 Heavy rainfall lashes parts of Uttarakhand, landslide hits Maldevta area in Dehradun**

**Source:** timesofindia.indiatimes.com, 11 June ,2021



DEHRADUN: A spell of moderate to heavy rainfall lashed several places in Uttarakhand, including state capital Dehradun, in the intervening night of Wednesday and Thursday. In the Maldevta area of Dehradun, a landslide triggered

by a downpour occurred following heavy rainfall causing damage to shops situated on Dwara-Maldevta Road.

Debris also entered houses and hotels and blocked the road connecting Tehri, Dhanaulti and Kaddukhal with Dehradun. Local villagers, whose houses were damaged by the debris, were forced to spend the night outside.

“There was road cutting work going on in the hill area and the entire debris dumped there came gushing down with water after heavy rainfall,” said a local resident, whose house was also damaged. Dehradun received 60mm rainfall in the early hours of Thursday, according to the rain data released by the regional meteorological centre.



Jakholi in Rudraprayag district was lashed by maximum 130mm rainfall while Pithoragarh received 60mm rainfall, followed by 50mm shower in Nainital. The Met centre has predicted more rains in Uttarakhand in the next few days. An orange and yellow alert has been issued of heavy rainfall in Pithoragarh, Bageshwar, Pauri, Rudraprayag, Dehradun, Nainital and Champawat districts on June 11.

"Rainfall will continue in Uttarakhand during the next 72 hours starting from June 10. The impact of the fresh western disturbance will be witnessed in both hills and plains," said Rohit Thapliyal, senior scientist at regional meteorological centre.

## **2.4 Uttarakhand: Ganga cross danger mark in Rishikesh and Haridwar**

**Source:** [freepressjournal.in](http://freepressjournal.in), 19 June, 2021

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**Chamoli: Avalanche after a glacier broke off in Joshimath in Uttarakhand's Chamoli district causing a massive flood in the Dhauli Ganga river, Sunday, Feb. 7, 2021. More than 150 labourers working at the Rishi Ganga power project may have been directly affected.**

Ganga river in Uttarakhand crossed the danger mark on Saturday following three days of incessant rains especially in the hills prompting authorities to sound an alert and evacuate villages along their banks. Bhagirathi too crossed the danger mark in Tehri district following heavy rains.

The Ganga exceeded the danger level in both Haridwar and Rishikesh while Bhagirathi crossed the danger mark at Devprayag in Tehri district.

The Ganga in Haridwar was flowing at 294.1 metres, 0.10 metres above its danger mark, according to the data on the Central Water Commission's (CWC) website.

The Ganga exceeded the danger level in Rishikesh and was flowing four centimetres above it, CWC Superintending Engineer Rajesh Kumar said.

Triveni ghat which was evacuated on Friday is inundated, Kumar said.

The Bhagirathi at Devprayag in Tehri district was flowing at 465.0 metres, two metres above the danger level at 463.0 metres and showed a rising trend, the CWC website said.

The residents of villages on the banks of the rivers are being moved to shelters run by the district administrations concerned and other safe locations, officials said.

Heavy rains have lashed various parts of Uttarakhand over the last three days with Chamoli receiving 142 mm of rainfall on Saturday followed by Karnaprayag with 136 mm, Sri Nagar in Pauri district 128 mm, Rudraprayag 103.8 mm, Joshimath 97.2 mm and Rishikesh 53 mm.

The Alaknanda river in Chamoli district was flowing two metres below the danger mark while Pindar river was flowing 1.5 metres below the danger level in Karnaprayag, Chamoli District Disaster Management office said.

Landslides triggered by heavy rains in the district also blocked three national highways and 84 motor roads with mounds of rubble.

Twenty-seven stranded people including women and children between Mona Cheda and Nalgaon in Chamoli district were rescued and brought to Narayanbagad late on Friday night.

The Badrinath National Highway is blocked at two places between Pipalkoti and Badrinath and the Gwaldam National Highway between Tharali and Karnaprayag, District Disaster Management Centre at Gopeshwar said.

The Gwaldam highway links Kumaon and Garhwal regions of Uttarakhand.

The Gairsain highway was also blocked between Simly and Adi Badri, it said.

Pithoragarh in Kumaon region has also been lashed by heavy rains with the main link road to Haldwani and Tanakpur markets besides around 22 major rural roads closed, District Disaster Management officer of Pithoragarh Bhupender Singh Mahar said.

In Almora, several key motor roads including that which link the district with Haldwani have been closed due to landslides on the way.

"Besides closure of roads, several villages in the district also complained of disruption of power supply," Almora's District Disaster Management Officer Rakesh Joshi said.

Samna-Liti road in Kapkot block of Bageshwar district has also been blocked due to a tree collapsing on the road.

## **2.5 Heavy Rains Cause Landslides, Wash Away Bridges in Meghalaya's Garo Hills**

**Source:** news18.com,30 June,2021



**Meghalaya rains**

Heavy rains continue to lash Meghalaya's Garo Hills regions on Wednesday, causing landslides and washing away of bridges, with the India Meteorological Department (IMD) issuing a red colour-coded alert (highest level of warning) to the state till July 1.

South Garo Hills received 280.8 mm rainfall in just 24 hours. A video of

Donigre to Dronggre Dolong bridge, Ruga South Garo Hills taken in the morning shows the destruction that the rains have caused in the region.

West Garo Hills is another worst affected district that has received 148.1 mm rainfall.

Many trees were uprooted and roads were blocked due to the rain. Waterlogging was also observed in several areas, however, there was no report of any casualty or injury.



The IMD has asked people to avoid fishing or camping or any other activity in rivers, and move away from landslide areas or downstream valleys. Talking about the havoc the district commissioner said Tura Dalu road has been cut off since morning. Garobada, Selsella roads were cut off for few hours, it has been cleared by still muddy.

District Magistrate of West Garo Hills Ram Singh said the authorities have cautioned people in the low-lying areas and Border Road Organisation (BDO) were at work. Further, in the press communique, IMD also stated that flash flooding can occur. If there is any possibility of a flash flood, move immediately to higher ground. Do not wait for instructions to move. The other regions in the state such as Sohra RKM (Cherrapunji Ramakrishna Mission) received 232.2 mm rainfall and Mawsynram, which is known to receive the highest average rainfall on Earth, recorded 225.6 mm rainfall in the last 24 hours. In a statement issued, IMD warned, "Under the influence of strong moist south-westerly winds; fairly widespread to widespread rainfall is very likely over Meghalaya during next 4-5 days. Meghalaya is very likely to receive isolated heavy to very heavy rainfall during June 29 to July 3 with isolated extremely heavy rainfall on June 29 to July 1, 2021."

## **2.6 IMD alerts: Heavy rainfall to continue in Himachal, Uttarakhand for 2 days**

**Source:** hindustantimes.com, 12 July, 2021



**At least six houses were swept away due to flash floods caused from heavy rainfall in Himachal Pradesh's Kangra district.**

Heavy rainfall is likely in Himachal Pradesh and Uttarakhand on Monday and the next two days as rains lashed several states in north India, causing flash floods and deaths due to lightning strikes, the India Meteorological Department (IMD) said. Flash floods

and cloudbursts were reported near Bhagsunag in Himachal Pradesh's Dharamshala and landslides in the hill state's Kangra district. At least six houses were swept away and over 10 people are feared trapped after the

landslide hit Kangra. And, more than 60 people lost their lives to lightning strikes amid heavy rainfall in Rajasthan, Uttar Pradesh and Madhya Pradesh.

IMD's senior scientist K Jenamani said on Monday that the monsoon has covered most parts of Rajasthan and some parts of Punjab. "For Delhi, conditions continue to remain favourable and we're monitoring the situation. Monsoon is active in peninsular India, parts of north India, including Uttarakhand and Himachal Pradesh," he was quoted as saying by news agency ANI.

As per IMD's latest bulletin, conditions are favourable for further advance of southwest monsoon over Delhi, some parts of Haryana, Punjab and Rajasthan, and the remaining parts of Uttar Pradesh on Monday.

**Here is a list of key IMD alerts due to the monsoon:**

1. Isolated heavy rainfall is very likely over Himachal Pradesh, Uttarakhand, Punjab, Haryana, Jammu and Kashmir, and northwest Uttar Pradesh, among others, during the next two days. Uttarakhand and Himachal Pradesh are very likely to observe heavy rainfall activity on Monday.
2. Isolated heavy rainfall is very likely over Rajasthan during the next five days.
3. Isolated heavy rainfall is very likely over Konkan and Goa between July 12 to 15, and over Telangana on July 12.
4. Isolated heavy to very heavy rainfall is likely over Gujarat, Maharashtra, coastal Andhra Pradesh, coastal and south interior Karnataka, Kerala and Mahe in Puducherry during the next two days.

## **2.7 Heavy rain, floods wreak havoc across J&K**

**Source:** dailyexcelsior.com, 13 July, 2021

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The India Meteorological Department (IMD) has issued an orange alert for J&K while yellow alert for adjoining Himachal Pradesh. The IMD has predicted heavy rain across the Northern region during next two more days.

The Jammu- Srinagar National Highway was blocked due to over-night rain at Samroli near Udampur and Magarkote-Digdol area in Ramban sector but it was restored after 2-3 hours of closure. The traffic remained moving on snail's pace on the highway in Ramban sector till late this evening due to single passage at several places after landslides.



Official sources said that due to landslides at Samroli during early hours today, the busy National Highway was blocked. However, it was restored within two hours. The movement of traffic was also disrupted twice in Magarkote and Digdol areas during the day today due to falling of boulders. However, the road was restored after clearance work. Slow movement of vehicles and traffic jams were witnessed in Ramban, Chanderkote and Digdol areas during the whole day today.

Sources further said that Jammu City recorded the highest ever rainfall of 150.6 mm during the past 24 hours since 1989 for the month of July. Heavy downpour was witnessed in other parts of the region as well. Katra and Samba received massive 76.6 mm and 119 mm rainfall, respectively during past 24 hours till 8 am today. Kathua recorded 24.8 mm, Batote 25.4 mm while Banihal 6.4 mm rainfall till 8.30 am today, the spokesman said.

The spokesman further said that moderate to heavy rain is likely to continue during next two more days, particularly in Jammu region which may cause flash floods in some areas and the temperature may stay 3-10 degree Celsius below normal.

At Kalika Colony of Bahu Fort area in Jammu, the flood water in Nallah wreaked havoc and caused extensive damage to over two dozen houses and other structures. Rain and Nallah water entered many houses in Shastri Nagar, Nanak Nagar, Gandhi Nagar, Trikuta Nagar, Channi Rama, Jawahar Nagar, Preet Nagar, Gangyal, Canal Road and Talab Tilloo areas. The public and vehicles movement remained affected till late hours in flooded streets today. The flood water caused massive damage to household goods and electronic gadgets of the people. A long wall of CRPF Centre at Ban Talab was collapsed while a small bridge at Gadigarh in Gandhi Nagar constituency was damaged. The flooded Nallah water also entered nearby Police Post and Govt school at Gadigarh besides many adjoining areas.

A car was trapped in the mud-slide on Doda-Kashtigarh road during morning hours today. However, the people onboard had narrow escape as they ran away leaving the vehicle. Thathri -Gandoh and several other link roads in Doda and Ramban were closed due to landslides.

Chenab, Tawi, Basantar, Tarnah and Ujh rivers besides many other Nallahs were flooded during morning hours today, but the water receded after 11 am. Eleven members of a nomad family were trapped in Ujh river and were later rescued by police and SDRF men. Eight cattle were also washed away in flooded Ujh river from Ghati and Rajbagh areas today. Traffic on several link roads in Kathua, Dyala Chak-Billawar, Samba-Sumb, Vijaypur, Gharota and Akhnoor, Khour area remained suspended due to flash flood in Nallahs.

The rain water was accumulated on highway at Hatli Morh, Kathua causing disruption in traffic movement for several hours. The rain water also entered many residential localities and markets in Kathua town due to heavy rain.

Basohli-Bani- Bharderwah Road, Bani-Dhaggar and two other local roads in Bani Sub Division were closed due to land slides. The power supply was also snapped but it was restored in the afternoon.

Three houses in Bani sub division belonging to Mobeen Ali, Mohd Arif ( Koti Chadyar) and Chandu Ram (Backon) and two houses in Lohai Malhar area of Billawar were collapsed due to land slides and rain, however, no loss of life was reported.

In Samba district heavy, rain created flood-like situation in many areas. In the morning, water over flooded from the check dam on Basantar river in village Dalote of Sumb block, due to which both the earthen banks of the check dam were damaged and the water of the river entered Amli and Dalote villages causing massive damage.

Local resident Krishna Singh said that the rainy season has just started, if these banks of the dam are not repaired soon, then many of their villages can suffer a lot. At the same time, to take stock of the situation, officials of the Flood Control department including Assistant Commissioner Revenue, Jatinder Mishra and Tehsildar Samba Ram Paul Sharma from the district administration also reached the spot and took stock of the situation. They provided assistance to the two families and shifted them to a safe place. The District Administration also issued an alert and created a control room for assistance.

Samba- Mansar road was blocked as a truck was stuck due to falling debris near village Daboh in the morning, which was later pulled out with the help of a JCB machine. The traffic was suspended for about an hour on this road.

Reports from Doda said that as predicted by MeT Department torrential rains were witnessed across Chenab belt on Monday. Rain since early morning has triggered flash floods in several areas of district Doda, in which a vehicle was also damaged.

The flash floods have been reported from several places including Kastigarh, Machipal area of Gandoh and Kahara in district Doda, due to which Kastigarh-Doda, Thathri-Gandoh and Kahara-Hallaran road got closed.

Meanwhile, district administration Doda has issued an advisory in view of torrential rains.

“Due to heavy rains in district Doda today, which are expected to continue for two more days, there are chances of flood and damage of roads etc, therefore, public of district Doda is advised not to venture out and avoid travel by road,” the advisory issued by administration read.

Advisory issued by Administration also cautioned public not to go near electric poles, wires, transformers, rivers, Nallahs and slide prone areas. Beside try to keep your mobiles charged and inform Tehsil, Sub Division or District Administration immediately in case of any mishappening.

The administration also issued contact numbers in case of any emergency which include 01996233337 (District Control Room) and 01996233530 (PCR Doda).

Reasi-Mahore and Mahore-Chassana-Budhal road was blocked due to landslides. However, Reasi-Mahore link was restored in the evening. Pilgrimage to Mata Vaishnodevi continued smoothly despite rain. However, chopper service was hit due to bad weather.

Reports from Srinagar said mercury today took a dip across Kashmir after the overnight moderate to heavy rainfall lashed the Valley, bringing about a much-needed relief from the scorching heat.

The weatherman in its update said that the rains occurred on expected lines and that there was more coming for both Kashmir and Jammu regions.

Chief Weatherman at MeT's Srinagar station, Sonum Lotus said that as expected very heavy showers occurred at many places of plains of Jammu whereas moderate showers reported at many places of Kashmir and hilly areas of Jammu.

“Today, the weather will remain overcast to cloudy at most places of J&K,” he added.

In the update, he also issued a warning stating that at present shower may generate flash flood and landslide in hilly area which may lead to blockage of roads.

Deputy Director, MeT Srinagar Dr Mukhtar Ahmad told Excelsior that Srinagar received 8.2mm of rain in 24 hours till 0830 hours and recorded a minimum temperature of 18.1 degrees Celsius against 22.8 degrees Celsius on the previous night and the maximum temperature today was recorded as 25 degrees Celsius which is around 8-degree deviation from the normal temperature.

In Kashmir, the MeT officials said, Pahalgam received the highest rainfall of 23.0 mm followed by Gulmarg which received 13.6mm of rain.

Gulmarg also recorded a considerable dip in the temperature with 10.6 degrees Celsius against 11.8 degrees Celsius during the night which is normal for the area during this time of the season. Pahalgam, similarly, recorded 14.8 degrees Celsius.

Qazigund received 5.2 mm of rain and Kokernag 7.4mm of rain. Kupwara town received 9.7 mm of rain and also witnessed a dip in mercury.

The weatherman had earlier informed that the lower-level easterly winds from the Bay of Bengal have further extended north-westwards, reaching up to Jammu, which then extended to Kashmir as well.

It has stated that due to the change in the system, low-level relative humidity has also increased over the region.

“The system is likely to cause heavy rain with thunder mainly in Pirpanjal Range of Jammu Division and plains of Jammu division on 12th July 2021,” it had warned, adding that light to moderate rain with thunder is expected in Kashmir division and light rain with thunder in Ladakh region.

The MeT warned that the change in the system may result in a moderate risk of flash flood in Ramban, Rajouri, Udhampur, Reasi, Jammu, Samba and Kathua districts.

The weatherman said that the change in the system could bring respite from the current scorching hot and humid weather during the next 3 days.

Meanwhile, a cloudburst today occurred in the Watlar area of Lar in Central Kashmir’s Ganderbal district which triggered flash floods and resulted in damage to scores of residential houses in the area.

Officials said that while there was a loss of property, no loss of life whatsoever was reported during the flash floods that hit the area in the wee hours today.

However, due to the cloudburst, the water level, as well as the flow, has increased in the Charnari Nallah which has further caused damage to the adjoining residential houses. The teams were dispatched to the area to ascertain the extent of the cause.

In the meantime, over 150 sheep were killed after a cloud burst struck a far-flung area of Jawdara Bahak in the Tulail area of Gurez in North Kashmir.

Officials said that the cloud burst struck a sheep sheds in the area and killed over 150 sheep.

“The live-stock belonged to two nomads namely Sharief Poswal son of Ghulam Nabi and Muhammad Ayoub Bajran, son of Fauluddin,” officials said.

The teams of police as well those from the Revenue have rushed to the spot to ascertain the extent of the loss.

## **2.8 Dozens dead in Mumbai after ‘monstrous’ monsoon rains cause landslide**

**Source:** theguardian.com, 19 July, 2021



**National Disaster Response Force personnel recover a body from the rubble in the aftermath of a landslide at a Bharat Nagar slum in Chembur, Mumbai, India**

More than 30 people have died in the Indian city of Mumbai after an intense burst of rainfall caused a landslide and wall collapse, as changing monsoon patterns due to climate change lead to more extreme rains across India.

Heavy rainfall, described by meteorologists as “monstrous”, hammered down on India’s financial capital over the weekend causing mass devastation.

In the eastern suburb of Chembur, the collapse of a wall in the night led to a landslide that enveloped homes as people were sleeping and killed at least 21, according to the National Disaster Response Force (NDRF).



At least 10 people were also killed in the suburb of Vikhroli in the city's north-east, when a landslide hit several homes, and three others in the city were killed in separate incidents.

The rain also inundated a water purification plant, leaving part of the city without drinking water. Mumbai residents were advised to boil water from the tap before consuming it. With heavy rainfall predicted for the next five days, the city is bracing itself for further casualties.



**A wall collapsed on some shanties in Chembur's Bharat Nagar area due to a landslide after heavy rainfall in the city**

The coastal city of Mumbai is always badly hit by the monsoon, and suffers flooding every year but it is feared that the changing patterns of the rains due to climate change will lead to even more extreme flooding and damage. In recent years, the monsoon has shifted towards long dry spells broken up by burst of extreme rainfall, which are more likely to flood drains and overwhelm infrastructure in the over-populated city.

The thunderstorm that caused the intense rainfall was described as "uncommon" for this time of year. On Sunday morning, some areas of Mumbai experienced over 20cm of rainfall in the space of just a few hours.

State environment minister Aadiya Thackeray said: "We have been talking about climate change and it is happening."

Current monsoon modelling systems also struggle to forecast such heavy downpours, meaning it is harder to give people prior warning of potential

flooding or landslides. On Sunday, it was only at 1am that a warning was put out about extreme rains.

Prime minister Narendra Modi tweeted his condolences to victims, and offered compensation to the families of those who had died in the landslides.

Mumbai, which is on the coast and is home to more than 12 million people, is also under threat from rising sea levels.

## **2.9 Landslides, monsoon flooding kill over 100 in western India**

**Source:** pbs.org,23 July,2021



NEW DELHI (AP) — Landslides and flooding triggered by heavy monsoon rain hit parts of western India, killing more than 100 people, officials and news reports said Friday.

More than 1,000 people trapped by floodwaters were rescued.

The dead included 54 killed in four landslides in the Raigad and Ratnagiri districts in western Maharashtra state on Thursday and Friday, according to District Collector Nidhi Chaudhary and state government official Sagar Pathak.

Many of those who were rescued were stranded on rooftops and even on top of buses on highways, Chaudhary said.

Pathak said more than 30 people were missing after the landslides.

Chaudhary said the rain had slowed, but water levels were rising again because of a high tide Friday. Rescuers, however, have reached the worst-hit areas.

Disasters caused by landslides and flooding are common in India during the June-September monsoon season, when heavy rains weaken the foundations of structures that are often poorly built.

Twenty-seven people were killed by houses collapsing or being swept away by rushing floodwaters in Satara district, the Press Trust of India news agency reported. It also said more than 20 deaths have been reported from the eastern districts of Gondia and Chandrapur.

Prime Minister Narendra Modi said he was anguished by the loss of lives.

“The situation in Maharashtra due to heavy rains is being closely monitored and assistance is being provided to the affected,” Modi tweeted.

Elsewhere, a house collapsed Friday after heavy rains in the Shivaji Nagar area in eastern Mumbai, killing at least four two people and injuring eight others, fire officials said.

In Ratnagiri district, 200 people were rescued from hilly areas on Thursday after the heavy rains. In the coastal town of Chiplun, home to 70,000 people, more than half the area was flooded, said B.N. Patil, district administrator of Ratnagiri.

The army, navy, coast guard and the National Disaster Response Force were helping in rescue operations, the defense ministry said.

An Indian navy statement said it deployed helicopters to evacuate stranded people and sent rescue teams with boats to the region.

Authorities on Friday sounded an alert in the southern state of Telangana, with heavy rains causing flooding in Hyderabad, the state capital, and other low-lying areas.

Meteorologists said the 30 centimeters (12 inches) of rain that has fallen so far this month in Hyderabad, one of India’s information technology hubs, is the most in July in 10 years. The floodgates of one of the main reservoirs, Osman Sagar, were opened for the first time in a decade to discharge excess water.

Last weekend, more than 30 people were killed in landslides triggered by heavy monsoon rain in and around Mumbai, India's financial and entertainment capital.

The monsoon is crucial for rain-fed crops planted during the season, but the rain often causes extensive damage and kills scores of people each year.

Experts said heavy rainfall along India's western coast is in line with how rainfall patterns have changed in the region in past years due to climate change.

"The frequency and intensity of heavy rains has increased," said Roxy Mathew Koll, a scientist at the Indian Institute of Tropical Meteorology in the western city of Pune.

He added that the warming Arabian Sea is driving more cyclones and more intense rainfall over short periods of time.

"Every year we need to be prepared on the west coast," he said.

## **2.10 9 killed as heavy rains lash parts of north, east India; red alert issued for Rajasthan**

**Source:** cnbctv18.com,31 July,2021

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Nine people were killed in rain-related incidents in Uttar Pradesh and West Bengal where torrential rainfall for the last two days threw life out of gear, while heavy showers drenched many parts of north India. The India

Meteorological Department issued a 'red alert' in Rajasthan, predicting very heavy rains in many districts of the state, while it issued an 'orange alert', warning of heavy to very heavy rainfall in almost half of Madhya Pradesh, which has so far received three per cent more rain than the average.

An 'orange alert' was also issued for Delhi where the weatherman predicted moderate rain on Saturday leading to possible waterlogging in low-lying areas, and major traffic disruptions. The Delhi administration sounded a flood alert and expedited efforts to evacuate people living in the Yamuna flood plains, as the river breached the danger mark of 205.33 metres amid heavy rains in the upper catchment areas.

The water level was recorded at 205.34 metres at the Old Railway Bridge at 11 am. It was 205.22 metres at 8:30 am, 205.10 metres at 6 am and 205.17 at 7 am, and is likely to rise further.





Three trekkers were reported missing on Friday in Himachal Pradesh where over 200 people remained stranded in Himachal in the state's Lahaul-Spiti following a cloudburst and landslides earlier this week, while the district administration of Maharashtra's Raigad asked 413 families, comprising 1,555 people, from the villages of Mahad and Poladpur talukas to move to safer places due to the threat of landslides.

The Shimla MeT Centre issued a yellow warning of heavy rains till August 3 as it advised people to not go near rivers and water bodies as the level may increase to heavy rains in the coming days. It also warned of landslides and predicted heavy rains in the plains and low and mid-hills of the state till August 5. The rescue operation to locate 20 people missing after a cloudburst in a village in Jammu and Kashmir's Kishtwar resumed on Friday after seven persons were found dead and 17 others were rescued in an injured condition as the remote Honzar village in Dacchan tehsil was hit by flash floods triggered by the cloudburst in the early hours of Wednesday.

Delhi recorded 42.8 mm of rainfall between 8.30 am and 5.30 pm on Friday, while the maximum temperature was recorded at 32 degrees Celsius, two notches below the season's average. Three persons, including a minor, were killed and four injured when the roof of a house collapsed on them due to heavy rains in Uttar Pradesh's Muzaffarnagar district. The incident occurred in Begarajpur village under the Mansoorpur police station area on Thursday night.

Six people were killed in rain-related incidents across West Bengal. Of the six, five persons died of wall collapse due to heavy rains in separate



incidents in different parts of the state, and one was electrocuted. The Southwest Monsoon gained momentum due to the low-pressure area over coastal Bangladesh and adjoining West Bengal leading to heavy rains in Rajasthan, the Meteorological Department said and issued a 'red alert', predicting very heavy rains in many districts of the state in the next 24 hours.

Heavy rain was recorded in many areas of Rajasthan in the last 24 hours, including 268 mm rainfall was recorded in Rajasthan's Shri Mahavirji (Karauli) followed by 135 mm at Rajgarh in Churu, 114 mm at Uchhain of Bharatpur and 104 mm at Mahwa in Dausa. Light to moderate rain and thundershowers occurred at most places in Uttar Pradesh. Rainfall was reported from Kheri, Auraiya, Jalaun, Muzaffarnagar, Hamirpur, Bareilly, among other places. The maximum temperatures on Friday hovered below normal limits at most places in Haryana and Punjab.

Bhiwani, Gurgaon and Ambala were among places in Haryana that received rains. The India Meteorological Department also issued an orange alert, warning of heavy to very heavy rainfall in almost half of Madhya Pradesh. The alert, which is valid till Saturday morning, forecasts the likelihood of heavy to very heavy rainfall with thunderstorm and lightning at isolated places in 24 districts, including Rewa, Sidhi, Satna, Singrauli, Shahdol, Umaria, Anuppur, Gwalior, among other places. In the eastern part of the country, torrential rain over the past two days owing to the formation of a low-pressure area over Gangetic West Bengal threw life out of gear in several districts in the southern part of the state, where streets have gone underwater and rivers overtopped banks, submerging low-lying areas.

Many Eastern Railway (ER) and South Eastern Railway (SER) trains had to be cancelled or rescheduled as tracks remained inundated near Howrah and Kolkata terminal stations, officials said. Several places in Kolkata, New Town and Howrah city remained heavily waterlogged throughout the day with gushing rainwater entering homes in some areas, causing immense hardship to residents.

Meanwhile, the district administration of Maharashtra's Raigad asked 413 families, comprising 1,555 people, from the villages of Mahad and Poladpur talukas to move to safer places due to the threat of landslides, an official said on Friday. The IMD said has predicted heavy to very heavy rainfall with extremely heavy falls at isolated places east Rajasthan and Madhya Pradesh, and heavy to very heavy rainfall at isolated places over sub-Himalayan West Bengal and Sikkim and Chhattisgarh.

## **2.11 Heavy monsoon rains kill 16 more, displace quarter million in India**

**Source:** dailysabah.com ,3 August,2021



**Residents ride a boat over a road submerged by floodwaters following heavy monsoon rains in Ghatal, around 100 kilometers from Kolkata, India, Aug. 2, 2021.**

Torrential monsoon rains in eastern India killed at least 16 people and displaced around 250,000 from their homes, authorities said Tuesday.

The latest deaths in West Bengal came a few days after 11 people were also killed in the state as the torrent of water swept away homes and triggered landslides.

Flooding and landslides are common during India's treacherous monsoon season from June to September and cause widespread devastation.

The annual downpours have been worsened by climate change, experts say.

Two river banks were breached and the flooding has affected at least half a million people in six districts in West Bengal over the past two days, the state's disaster management minister Javed Ahmed Khan told Agence France-Presse (AFP).

Five of the 16 people killed were swept away in the flood and the rest died when their mud houses collapsed, officials said.

Military helicopters plucked dozens of people from the rooftop of a submerged building, including a 100-year-old woman and a nine-month-old baby, Khan added.

Panicked residents had to flee for higher ground after water from a nearby dam was released, causing sudden flooding.

"We fear scores of people are still marooned. Indian Air Force helicopters and disaster management personnel are struggling to rescue them," he added.

Villager Samir Nandi, 65, said he had "never witnessed such a flood."

"Many people in (my) village took refuge on the roof of the buildings and they are waiting to be rescued."

Authorities have set up more than 40 relief centers for the displaced in the flood-affected districts, senior state official Harekrishna Dribedi, said.

This year's monsoon, which had earlier inundated the western coast, has claimed the lives of at least 250 people so far.

Last month, at least 200 people died in the western state of Maharashtra after landslides sent torrents of mud onto villages.

The northern Himalayan states, including Uttarakhand and Himachal Pradesh, have also reported several deaths.

## **2.12 Coastal Karnataka bears brunt of heavy rain, subsequent flooding**

**Source:** thefederal.com, 5 August, 2021

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On the night of July 22, Dongri village in Ankola, along the Gangavali river in Western Ghats of Karnataka, received unprecedented rainfall, causing flash floods in villages downstream.

Ruvu D Harikantra, a 65-year-old farmer, has a terracotta tiled-roof house in Bilehoingi village, located 2 km from the river and 5 km from the sea coast. Heavy rains in the upper region flooded the area and Harikantra's house was submerged the next morning. Due to incessant downpour, he had to move with his family to a safer location.

Ankola taluk in Coastal Karnataka has been facing floods for the last three years. Recent rains left houses flooded and turned tiny villages into islands.



### **NDRF personnel busy relocating people during the recent floods in Karnataka**

Harikantra's house has gone under water every year since 2019. Besides suffering damage to his house, the farmer lost 2-3 quintals of rice, millet and day-to-day items in floods. The 2021 rains only made it worse for him with clothes, bed, refrigerator and grinder all getting submerged. He estimates a combined loss of ₹10-15 lakh due to heavy rains over the last few years.

Harikantra says this year's floods were the worst. He compared it to the deluge in 1961.

In 2019, the Karnataka government announced a temporary compensation of ₹10,000 and a relief measure of ₹5 lakh for those whose houses were damaged in floods. Harikantra received ₹3 lakh of it and is still waiting for the rest of the amount. The government also said they would accommodate all the affected people in 50,000 temporary houses on rent for a brief period, but Harikanta says the benefit never came.

"While we were rebuilding the house to a livable condition, in 2020 the deluge again caused havoc. The government denied compensation saying I was a beneficiary in 2019 and so cannot get it again," he said.

Manoj Ranjan, Director of Karnataka State Natural Disaster Monitoring Centre (KSNDMC), said that in the last three years Karnataka received rainfall which was above the average rainfall for last 50 years.

Environmentalists and climate experts indicate that heavy rainfall and subsequent flooding will lead to migration of people from semi-urban areas to cities.

Professor TV Ramachandra of the Centre for Ecological Sciences, Indian Institute of Science (IISc), says large scale land degradation with deforestation in Western Ghats are the prime reasons for natural calamities in the region.

Ramachandra' says land degradation has reduced the water retention capacity of soil, leading to more flooding and increased instances of landslides and mudslides in Kodagu, Chikkamagaluru, Shivamogga, Uttara Kannada and Dakshina Kannada districts. Ironically, these regions suffered scarcity of water days after rains subsided.

“Our study in the Western Ghats reveals an increase in average temperature and decline in the number of rainy days. While the quantity of precipitation (rain) has remained the same, reduced rainy days have caused high intensity rainfall followed by flooding,” Ramachandra said.

In North Karnataka, increased rainfall in catchment areas is leading to rise in water level in rivers, cause trouble in low-lying areas.

The government, back in 2009, formed a committee to study the possible effects of climate change on the region. Though the committee warned the government back then to act immediately, successive governments have ignored the report.

Ramachandra suggests that large scale projects such as tunnels, road widening, setting up large scale industries, etc. need to be banned in ecologically fragile regions. “The cost of disasters (landslides, mudslides, floods, zoonotic diseases) are higher than the benefits accrued from any of the project,” he said.

Ramachandra called for action to implement ecosystem restoration approaches in managing natural resources across the country. He emphasised on dislodging the land, timber and water mafia nexus of contractors, corrupt bureaucrats and political class, who have been benefited by degradation of natural ecosystems, while depriving people of the right to life with clean air and water.

“We need to question the current paradigm of developmental path with the erroneous economic metric – GDP,” he adds. “Now is the time to develop GEP – Global ecological product through natural capital accounting and valuation of ecosystem services to ensure sustainability of natural resources with the development of the region.”

Manoj Ranjan of KSNDMC said the government is trying to address the problem through MGNREGA schemes thus rejuvenating tanks, building check dams and forming weather and water committees, but individual



efforts at conservation can play a key role in increasing agro-forestry belt in the region. He also laid stress on restoring ecosystems with native species of trees.

Ramachandra said that increased instances of extreme weather events in Karnataka are signs of climate change caused due to warming of the planet with escalating emissions (GHG – Greenhouse gases). “The government needs to prioritise ecosystem conservation to mitigate the impacts and sustain livelihood of people,” he adds.

A study at IISc demonstrates that villagers in the vicinity of native forests earn about Rs 154,000 per acre per year due to the availability of water throughout the year. Here, farmers can grow three crops (even cash crops) and get higher yield due to efficient pollination in the presence of diverse and abundant pollinators.

In contrast, farmers in the vicinity of monoculture plantations and degraded landscapes (with forest cover less than 30%) earn ₹32,000 per acre due to availability of water for 4-6 months and the absence of pollinators resulting in lesser yield.

Besides, regions with native species of forests have relatively lower land surface temperatures (less by 3 to 4 degrees Celsius). Thus emphasising the need to restore degraded forest patches to support livelihood and sustain water sources.

“Maintaining at least 33% green cover of native species will ensure water in the streams (and wells) throughout the year, adequate oxygen in the region, and mitigate instances of flooding and droughts,” Ramachandra said in conclusion.

### 3. Cyclone, Hurricane, Typhoon



In meteorology, a **Cyclone** is a large scale air mass that rotates around a strong center of low atmospheric pressure, counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere as viewed from above. Cyclones are characterized by inward-spiraling winds that rotate about a zone of low pressure. The terms "hurricane" and "typhoon" are regionally specific names for a strong "tropical cyclone".

- **"Hurricane"** (the North Atlantic Ocean, the Northeast Pacific Ocean east of the dateline, or the South Pacific Ocean east of 160°E)
- **"Typhoon"** (the Northwest Pacific Ocean west of the dateline)
- **"Severe tropical cyclone"** or "Category 3 cyclone" and above (the Southwest Pacific Ocean west of 160°E or Southeast Indian Ocean east of 90°E)
- **"Very severe cyclonic storm"** (the North Indian Ocean)
- **"Tropical cyclone"** (the Southwest Indian Ocean)

#### Effects:

- Main effects of tropical cyclones include heavy rain, strong wind, large storm surges near landfall, and tornadoes.
- Cyclones are dangerous because they produce destructive winds, heavy rainfall with flooding and damaging storm.
- The heavy rains from tropical cyclones can also cause flooding.
- Typhoons and hurricanes can affect the production and emission of greenhouse gases in coastal wetlands with heavy rains, floods, and saltwater intrusion caused by storm surges. There has been less study

of the impact of heavy rains and floods on the production and emission of greenhouse gases.

### **3.1 Cyclone Hits India On Deadliest Day Of Pandemic**

**Source:** npr.org, 18 May, 2021

On the same day the country confirmed its highest-ever daily death toll from COVID-19, it was also hit by a deadly storm. Cyclone Tauktae barreled into India's west coast overnight packing wind gusts of up to 130 miles per hour — some of the strongest on record — before weakening over land later Tuesday.

Crews in orange hazmat suits patrolled coastal areas with megaphones, urging hundreds of thousands of residents to move to higher ground. More than 200,000 people were evacuated from their homes in the western state of Gujarat. Hundreds of COVID-19 patients were also shifted from coastal wards in Mumbai to other hospitals farther inland.



**A police officer helps a public transport driver cross a flooded street caused by heavy rain from Cyclone Tauktae in Mumbai.**

Cyclones are more common on India's east coast over the Bay of Bengal. But forecasters say climate patterns are changing, and this one hit several states on India's west coast along the Arabian Sea: Kerala, Karnataka, Goa, Maharashtra, Gujarat. It was the fiercest storm to hit that region in decades.

At least 16 people were killed by flying debris, building collapses and flooding. A search and rescue operation is underway for dozens of barge workers missing off Mumbai's coast. At least 177 workers have been rescued by Indian navy helicopters in "extremely challenging circumstances," the navy tweeted. Coastal slums are flooded, and electricity lines down. Relief efforts have been complicated by coronavirus lockdowns. "You have to evacuate [people] in a certain way because you do not want COVID infections on your hands post-cyclone," India's disaster relief chief, Satya Pradhan, told local media. One of the biggest concerns remains ensuring a constant electricity supply to COVID-19 hospitals and industrial plants generating and bottling medical oxygen. Tauktae weakened into a "severe cyclonic storm" on Tuesday afternoon, India's Meteorological Department tweeted. Also Tuesday, India's Health confirmed 4,329 deaths from COVID-19 — the country's deadliest single-day toll since the pandemic began. It also confirmed 263,533 new coronavirus cases, down from more than 400,000 a day earlier this month. Scientists say that those tallies are likely vast undercounts and that it's unclear when India's wave may peak because testing is so low in rural areas.

### **3.2 Tens of thousands homeless in eastern India after cyclone batters coast**

**Source:** reuters.com, 26 May, 2021



**A general view shows flooding as Cyclone Yaas approaches Bhadrak, Odisha, India, May 26, 2021**

BHUBANESWAR, India, May 26 (Reuters) - A powerful cyclone swept into eastern India from the Bay of Bengal on Wednesday, inundating hundreds of low-lying villages, making more than 50,000 people homeless and killing at least one person, officials said.

Cyclone Yaas was packing gusts of up to 140 kph (87 mph) as it made landfall, days after another storm tore up the western coast, triggering mass evacuations and piling pressure on authorities battling a deadly second wave of the coronavirus.

In West Bengal, an eastern state that borders Bangladesh, authorities said that around 1,100 villages had been flooded by storm surges, leaving at least 50,000 homeless.

"But the figure may rise as reports are yet to reach us from interior areas," state minister Bankim Hazra told Reuters.

Across the state, rising waters breached river embankments in more than 100 locations, with the storm damaging 20,000 traditional mud homes and killing at least one person after a house collapsed, West Bengal Chief Minister Mamata Banerjee told reporters.

In neighbouring Odisha, around 120 villages had been swamped by heavy rain and sea water whipped up by the cyclone but people in most areas had already been moved to storm shelters, the state's top bureaucrat, Suresh Mahapatra, told Reuters.

In all, authorities had evacuated more than a million people before Cyclone Yaas made landfall.

Cyclones in the Bay of Bengal are common at this time of year and often roar ashore, bringing death and destruction to the coastal areas of both India and neighbouring Bangladesh.

The devastating wave of virus infections complicated storm preparations. Odisha officials said they had suspended testing, vaccination and a door-to-door health survey in the three districts in the storm's path.

But Mahapatra said many doctors and hospital staff in the state had camped inside their facilities as the storm bore down, and key services were continuing with minimal disruption.

"All hospitals, including COVID hospitals, are running smoothly," he said.

Weather officials in Bangladesh said the storm was likely to swamp low-lying areas of 14 coastal districts, bringing tides three to four feet (0.91-1.22 meters) higher than normal. They advised fishing boats and trawlers to stay in shelter.



### **3.3 Another cyclonic storm brewing? Low-pressure area set to form over North Bay of Bengal, says IMD**

**Source:** [financialexpress.com](https://www.financialexpress.com), 8 June, 2021

IMD Weather forecast: A few days after the country witnessed two cyclones – Tauktae and Yaas – the India Meteorological Department has said that another low-pressure area is set to form over the Bay of Bengal around June 11. The low pressure area would be formed over North Bay of Bengal and neighbouring areas. This usually has the potential to turn into a cyclone. Meanwhile, the IMD has said that from June 10, the southwesterly winds would also strengthen over the Arabian Sea. This would lead to the advancement of the southwest monsoon into eastern India.

#### **Cyclone 2021 in India: Is another cyclone coming?**



**Fishermen are advised not to set out to sea during the period, said the IMD.**

Low pressure formation over Arabian Sea led to Cyclone Tauktae that hit the western coast of India last month, while another subsequent low pressure formation over the Bay of Bengal caused Cyclone Yaas merely a week later. With two cyclones already having struck and impacted lives and property, that too amid the COVID-19 pandemic, a third one would definitely make things worse for the country to handle.

However, the IMD has sophisticated forecast systems and is able to issue a warning a few days in advance about such a pressure likely turning into a cyclone. The IMD has at the moment not issued any such warning regarding this low pressure formation, meaning that at least for now, it does not have the potential to turn into a storm.

### **Monsoon 2021: IMD issues rain warning**

The department said in a statement that the monsoon would advance to the remaining parts of Maharashtra, Andhra Pradesh and Telangana by June 11. Meanwhile, Jharkhand, Chhattisgarh, West Bengal, Bihar, Odisha, east UP, and some parts of Gujarat and MP between June 11 and 13.

It also issued warnings, stating that from June 10, most of eastern and central India would receive fairly widespread to widespread rainfall, marking the beginning of the monsoon. On June 10 and 11, Odisha and West Bengal are likely to receive isolated heavy to very heavy rainfall, and these conditions are likely to prevail over Jharkhand on June 11, and on eastern MP, Chhattisgarh and Vidarbha on June 11 and 12. Odisha is also very likely to get isolated extremely heavy rainfalls on June 11 and 12.

On the other hand, the west coast of the country is also likely to get an enhanced rainfall starting from June 10. Mahe, Kerala, coastal and south interior Karnataka, south Gujarat, Yanam and coastal Andhra Pradesh, Konkan and Goa region are likely to witness isolated heavy to very heavy rainfall between June 11 and 13.

### **3.4 IMD forecasts intense rain in northeast, cyclonic circulation in Bay of Bengal**

**Source:** hindustantimes.com 12 August, 2021

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The India Meteorological Department (IMD) has forecast intense rainfall spell over northeast and adjoining east India till August 14 and reduce after that. For the rest of the country, the monsoon activity will be weak, the weather department further said in its forecast on Thursday.

"Isolated extremely heavy rainfall is also likely over Assam and Meghalaya during 12th and 13th and over Sub-Himalayan West Bengal and Sikkim on 12th August," the IMD said in its latest weather update.

The IMD said that a cyclonic circulation is likely to be formed over west-central and adjoining northwest Bay of Bengal around Independence Day. "A low pressure area is likely to be formed during next 48 hours, and fairly widespread rainfall activity is likely over Odisha, Coastal Andhra Pradesh,



**NDRF personnel evacuate residents from inundated houses following the flooding of River Ganga, in Prayagraj, Uttar Pradesh, on Thursday**

Telangana, Vidarbha, and Chhattisgarh. Isolated heavy to very heavy falls are likely over Odisha during 15th-17th," the weather department said in the forecast posted on its Twitter handle in the form of a thread.

It also said that there will be gradual increase in rainfall activity over northeast peninsular and adjoining east-central India from August 15.

Monsoon rains in India till August 11 were below average for the second straight week, the India Meteorological Department (IMD) had earlier, raising concerns over production of summer-sown crops such as cotton, soybean, corn and rice.

India received 35 per cent less rain than the 50-year average in the week just ended, with the shortfall as high as 98 per cent in cotton and soybean growing regions in central and western India, the IMD data showed on Thursday.

While monsoon rains were 10 per cent above average in June, they turned seven per cent below average in July. Overall rains have been six per cent below average so far in the season that began on June 1.



### **3.5 Gulab remnants may intensify into cyclonic storm, rain alert for Maharashtra, Gujarat**

**Source:** indianexpress.com,30 September,2021



**There will be a reduction in the rainfall activity in Mumbai and neighbouring districts from Thursday morning**

THE REMNANTS of Cyclone Gulab are likely to enter the Arabian Sea on September 30 and intensify into a cyclonic storm and then move towards Pakistan, the India Meteorological Department (IMD) said on Wednesday.

As of Wednesday, the remnants of the Cyclone Gulab lay as a well-marked low-pressure area over the south Gujarat region and adjoining Gulf of Khambhat.

IMD in its afternoon bulletin stated that the well-marked low-pressure area can intensify into a cyclonic storm, “It is very likely to move west-northwestwards, emerge into the northeast Arabian Sea and intensify into a depression by tomorrow (September 30, 2021) morning. Then it is very likely to move further west-northwestwards and intensify into a cyclonic storm during the subsequent 24 hours. Thereafter it is likely to continue to move west-northwestwards towards Pakistan – Makran coasts, moving away from the Indian coast.”

Under the influence of the development of a strong weather system, light to moderate rainfall at most places with heavy to very heavy falls at isolated places are very likely over Saurashtra and Kutch region and heavy falls are

likely at isolated places over the Gujarat region and the north Konkan region of Maharashtra.

There will be a reduction in the rainfall activity in Mumbai and neighbouring districts from Thursday morning.

According to the district forecast and warning issued by the IMD, moderate rainfall is likely in Mumbai, Thane, Palghar and the south region and the rain-battered Marathwada, Vidarbha and north Madhya Maharashtra region.

According to the 24-hours forecast, light to moderate rain may take place in the city and its suburbs with the possibility of heavy showers at isolated places. In the 24 hours ending at 8:30 am, IMD's Santacruz observatory recorded 100.5 mm rain.

Through the day, overcast skies, few intense spells and gusty winds were witnessed in some parts of the city and its suburbs. In the nine hours ending at 5:30 pm, IMD's Santacruz observatory recorded 15.8 mm rain, while the Colaba observatory recorded 5.5 mm rain during the same period.

Because of likely tropical cyclone formation over Northeast Arabian Sea, fishermen have been advised not to venture into north & adjoining central the Arabian Sea and along and off Gujarat and north Maharashtra coasts from 30 September till October 2. Fishermen who are out at sea over the above region are advised to return to safer places/back to the coast by evening, said IMD.

### **3.6 Cyclone Jawad May Turn Severe, Move Towards Odisha-Andhra Coast: IMD**

**Source:** <https://sambadenglish.com>, 7 October, 2021

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Bhubaneswar: A severe cyclone may form over Bay of Bengal and move towards south Odisha and adjoining north Andhra Pradesh coasts, the India Meteorological Department (IMD) said in a forecast today.

As per the prediction, a low pressure area over north Andaman Sea may form around October 10. It may intensify into a depression over east-central Bay of Bengal around October 14 with west-northwestwards movement towards south Odisha and adjoining north Andhra Pradesh coasts.

Some models are indicating intensification of this system up to severe category of cyclonic storm.



“Most of the numerical models including IMD GFS, NCEP-GFS, GEFS, NCUM, NEPS, ECMWF are indicating development of a low pressure area over north Andaman Sea around 10th October. However, GFS group of models are indicating development of depression over east-central Bay of Bengal around 14th October with west-northwestwards movement towards south Odisha and adjoining north Andhra Pradesh coasts. These models are also indicating intensification of this system up to severe category of cyclonic storm,” the IMD said.

“However, models like ECMWF, NCUM and NEPS are not indicating any significant development of this system. The Genesis Potential Parameter based on IMD GFS is indicating potential zone of cyclogenesis over east-central Bay of Bengal on 12th October with subsequent west-northwestwards movement till 14th October,” the agency said.

If the system intensifies into a cyclonic storm, it will be named as Cyclone Jawad.

There is also an indication by a few models that another Low Pressure Area could form over north Andaman Sea and adjoining Myanmar coast towards the middle part of week 2 (15.10.2021-21.10.2021) without much intensification, it added.

Further, CFSV2 ensemble runs are indicating likely formation of a Low Pressure Area over east central Arabian Sea off south Maharashtra–Goa coasts around 11th October, becoming more marked and moving west-northwestwards towards Oman coasts, where it is shown to be getting dissipated over the Sea by 18th October.

## 4. Smog and Urban Air Pollution



**Smog** is air pollution that reduces visibility. The term "smog" was first used in the early 1900s to describe a mix of smoke and fog. The smoke usually came from burning coal. Smog was common in industrial areas, and remains a familiar sight in cities today. Today, most of the smog we see is photochemical smog.

### **Types:**

Sulfurous smog and photochemical smog are two distinct types of smog recognised so far. Sulfurous smog, also known as London smog, develops due to high concentration of sulfur oxides in the air.

### **Effects:**

Smog can irritate your eyes, nose and throat. Or it can worsen existing heart and lung problems or perhaps cause lung cancer with regular long-term exposure. It also results in early death. Studies on ozone show that once it gets into your lungs, it can continue to cause damage even when you feel fine.

**Urban air pollution** are anthropogenic activities, including transportation, domestic use of fossil fuels, industrialization, power generation, combustion and agriculture and beauty products.

**Effects:**

Air pollution is a major cause of disease and death. As urban air quality declines, the risk of stroke, heart disease, lung cancer, and chronic and acute respiratory diseases, including asthma, increases for the people who live in them.

#### **4.1 Mumbai Witnesses Worst Air Quality Than Delhi, Celebrities Complain As Smog Covers The City**

**Source:** [indiatimes.com](https://indiatimes.com), 11 January, 2021

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Mumbai air is currently filled with smog and it has been beating Delhi for several days now. While Delhi's Air Quality Index (AQI) today is 235, Mumbai's overall Air Quality index is 266 today. In the past few days, Mumbai's AQI had crossed 300 mark and reached the severe category.



On Friday as well, Mumbai had again recorded an AQI of 317 which was worse than that of Delhi, an official of the India Meteorological Department said. Delhi on Friday reported AQI of 221.

This year, the air quality in Mumbai has been worst and even celebrities are complaining.

Juhi Chawla said there's no clean air in Mumbai.

"There is no clean air in Mumbai, just a lousy heavy dusty smog!!", she tweeted and shared a few pictures of the city's skyline.



"The air quality in #Mumbai has been worse than #Delhi. It is a myth that only North India suffers poor #AQI. Some of the biggest contributors to #airpollution are waste burning, construction dust, industrial pollution, vehicle emissions. #BeatAirPollution," Dia Mirza tweeted.

Sharing a photo of the city's skyline on his Twitter, Ranvir Shorey wrote, "Can someone tell me what is this white haze covering #Mumbai, and how long it's going to last? Cause it's been here all of this year, and it's getting me down! #weather."

A senior official of the Met department explained why Mumbai has been witnessing poor air quality index.

"It is due to the interaction of western disturbances and easterly waves. Both the weather systems are strong and deep," said.

"A thick band of clouds extending from coastal Karnataka and Goa to Konkan area is there. It is further extending till Madhya Maharashtra, as per the latest satellite images. There is a possibility of thunderstorm and rain on Saturday or Sunday," he said.

## **4.2 Air quality in Delhi, neighbouring areas ‘severe’, visibility low due to fog**

**Source:** scroll.in, 15 January, 2021



### **A man pulls his loaded rickshaw along a street amid heavy smog conditions in Delhi on Friday**

The air quality in Delhi and its neighbouring areas was in the “severe” category on Friday. Visibility in the Capital was also low due to a dense layer of fog.

Delhi’s average air quality index at 1 pm was 462, according to the Central Pollution Control Board. At 4 pm on Thursday, the Capital’s AQI was 429. This value was an average of 24 hours. According to the agency’s air quality index or AQI, any reading above 100 on a scale of 500 is progressively unsafe for health.

The minimum temperature in Delhi on Friday – 6.7 degrees Celsius – was higher than normal due to cloudy weather, PTI reported, citing the Indian Meteorological Department.

Meanwhile, AQI value at 1 pm at Noida’s Sector 62 was 470 and 486 in Ghaziabad’s Indirapuram area. Gurugram’s Vikas Sadan registered an air quality index value of 420.

Parts of Rajasthan, Punjab, Haryana and Bihar also saw heavy fog on Friday morning, ANI reported. As many as 14 trains were running late because of the weather.



Kuldeep Srivastava, the head of the Regional Weather Forecasting Centre in Delhi, said the reduction of wind speed across North West India has contributed to the poor air quality, Hindustan Times reported. “In Delhi, it [wind speed] is only around 6 mph and the wind direction is south-westerly,” he added. “So, the air quality has deteriorated and there is little possibility of pollutants dispersing.”

Minimum temperatures in North West India are likely to remain below normal over the next few days, the newspaper reported, citing the weather office. Punjab and Haryana, Delhi, Uttar Pradesh, and Bihar are likely to experience severe cold in the next few days.

### **4.3 Deadly Smog Over India Won’t Lift Until March, Copernicus Says**

**Source:** bloomberg.com,16 February,2021



**An East Delhi Municipal Corporation vehicle sprinkles water to control dust as commuters drive along a road amid smoggy conditions in New Delhi on November 15, 2020**

A toxic-dust cocktail that has engulfed large swathes of India since October isn’t expected to lift until next month, prolonging the exposure of people to emissions that can dramatically reduce their lifespan.

This week's forecast by the Copernicus Climate Change Service follows a new study by scientists at Harvard University showing that some 2.5 million Indians die annually from air pollution. Smog season recurs yearly in cities like New Delhi as burning farmland combines with fossil fuel exhaust, enveloping urban centers during cold months when demand for heat is high and air circulation is muted.

"This winter haze could potentially continue until the spring when increased temperature and changes in the weather will help to dissipate the pollution," said Mark Parrington, a senior scientist at Copernicus. The danger arises from "activities such as traffic, cooking, heating and crop stubble burning which are able to accumulate over the region due to topography and cold stagnant conditions."

The Harvard study published this month in Environmental Research concluded that previous estimates of deaths caused by long-term exposure to airborne toxic particles were too low. "Often, when we discuss the dangers of fossil fuel combustion, it's in the context of carbon dioxide and climate change and overlook the potential health impact of the pollutants co-emitted with greenhouse gases," author Joel Schwartz said in a statement.

"By quantifying the health consequences of fossil fuel combustion, we can send a clear message to policymakers and stakeholders of the benefits of a transition to alternative energy sources." Populations in Lahore, Dhaka and Kathmandu are being similarly impacted by the smog, according to Copernicus, which estimates that chronic exposure to pollution can reduce lifespans by two years in the worst-impacted cities.

#### **4.4 Green score in Delhi hit by persistent poor AQI**

**Source:** hindustantimes.com, 5 March, 2021

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Consistent poor air quality and high levels of microscopic particulate matter pollutants have got Delhi 42nd rank in the environment category among 49 cities with a million or more population in a survey by the Union housing and urban affairs ministry for the Ease of Living report that was released on Thursday.

Environment was one of the metrics under the Sustainability Pillar on which Delhi scored 56.02, slightly above the national average of 53.63, securing the 28th rank. According to the report, for ranking the cities on environment indicators such as water quality, total tree cover, hazardous waste generation and air quality index (measuring SO<sub>2</sub>, NO<sub>2</sub>, and PM<sub>10</sub>) were considered.



**According to the report, for ranking the cities on environment indicators such as water quality, total tree cover, hazardous waste generation and air quality index were considered.**

Despite steps by local and central agencies, Delhi's city's air quality takes an annual plunge every winter, with the air quality hitting 'emergency' levels on the AQI scale, especially between

December and January. The cold conditions and low wind speed often contribute to worsening the

pollution levels. A CSE analysis released on Wednesday showed that in 2020 even though the severity and duration of smog episodes were lower, the seasonal average levels of PM 2.5 was higher.

"Infrastructural capacity, economic opportunities and welfare services are already under tremendous pressure with rapid expansion of urban spaces. Yet, looming threats arising due to climate change have the potential to cause irreversible damage to the world as we know it. For India, the impact may be even higher," the report read.

Pune, with a score of 75.74 topped the list of cities in the Sustainability category, followed by Visakhapatnam, which scored 65.18 and Pimpri Chinchwad, whose score was 65.09.

Environmental experts said that the city still needs to do a lot of work in the fields of water and waste management and providing a green urban infrastructure to its citizens.

The Institute for Management Development (IMD), in collaboration with Singapore University for Technology and Design (SUTD), had released the 2020 Smart City Index last year, which showed that Delhi's global rankings had dropped from 68 in 2019, to 86 last year.

"Cities in India (New Delhi, Mumbai, Hyderabad, Bengaluru) suffer significant drops this year. This can be attributed to the detrimental effect that the pandemic has had where the technological advancement was not up to date," the report said.

It added that apart from the problem of air pollution, Delhi needed to tackle the issues of “basic amenities”, such as the provision of clean water to all.

Anumita Roychowdhury, executive director (research and advocacy), Centre for Science and Environment (CSE), said that Delhi was particularly lagging in its efforts towards solid waste management.

“Work has been done in the field of pollution control and we are seeing that every year, Delhi is managing to bring down its pollution curve but a major area where work is lagging is solid waste management, there are still areas where door-to-door waste collection is not happening. Recycling is not the focus and dumping at landfills is continuing; all these areas factor in to make a city more sustainable,” Roychowdhury said.

The report said that cities such as Delhi, Greater Mumbai, Kochi, Hyderabad, Indore, Trivandrum and Lucknow showed poor performance in developing green spaces and buildings.

Green spaces and buildings include indicators of availability of green spaces, whether the city incentivises green buildings, and the presence of green buildings.

#### **4.5 Delhi’s Air Quality – Rhetorics Can’t Blind The Facts**

**Source:** thecsrjournal.in,3 April,2021



Delhi’s tryst with poor air quality during winters is not new, it’s an annual occurrence. The severity of air pollution last year crossed all safety indices forcing the government to declare a public health emergency. The air quality index monitors

across the city recorded ratings of 999, the reading was 50 times more than the safety level prescribed by the World Health Organization (WHO). Long before winter approaches, the air quality has already gone for a toss in the national capital regions.

## **What happened in 2010?**

The city has been dealing with smog and an increased level of pollution during winter since the year 2010. The question is why since 2010? The answer lies towards the west of Delhi, in the state of Punjab. The State produces the majority of the country's food surplus and in order to do so, the State in the past indulged in rigorous and intensive farming techniques. One such technique was to use inexpensive and subsidized electricity to pump out groundwater for irrigation. This fueled water shortage as the groundwater reserves began to deplete due to exploitation. The Punjab government as a measure to combat it, in the year 2009, enacted the Punjab Preservation of Subsoil Water Act.

## **Burning up**

The Act changed the way farmers planted rice. The crop is traditionally cultivated in two stages, it is first cultivated in a nursery and then transplanted to a field. The Act prohibited sowing the crop in a nursery before May 10 and transplanting before June 10 every year. This calculated delay gave enough time for the seasonal monsoon to recharge the aquifers, but it bereaved the farmers of enough time for the next harvest.

A delayed rice harvest in October leaves farmers with less than a month to prepare the field for the winter wheat crop which is ideally sown in November. With barely any time left to prepare the fields for the next crop and highly-priced seeder machines (despite the subsidy), the small scale farmers resort to the cheapest and quickest method available — burning the crop residue.

## **Other causes of air pollution**

The moot point is that it's not just the stubble that is choking Delhi — the unchecked urban sources of pollution such as vehicular emissions, increased construction, cooking fires among others are together responsible for the predicament. The geographical location of Delhi and the extremities of the weather can't be changed. These factors turn Delhi into a gas chamber that needs to be inoculated.

Delhi has been fighting its battle against air pollution for more than 20 years now. Over the years, the Delhi government has taken formidable steps to control air quality such as relocating the worst category of industries from Delhi to the outskirts or NCR, setting up new emission standards and introducing CNG-based public transport.

However, the population in and around Delhi quadrupled in these years and with it increased the vehicles, the municipal solid waste and industries. The



total number of registered vehicles in Delhi has increased from 4.24 million in 2004 to more than 10.8 million in March 2018.

### **Regulatory measures**

Owing to vehicular pollution and its adverse ill-effects on health, the government of India announced that it will adopt Bharat Stage VI (BSVI) emission norms by 2020. Bharat stage emission standards (BSES) are emission standards set by the Central Pollution Control Board under the Ministry of Environment, Forest and Climate Change, to regulate the output of air pollutants from internal combustion engines and spark-ignition engines equipment, including motor vehicles.

Notable efforts related to monitoring air quality have been made in recent years. The Ministry of Environment, Forest and Climate Change (MoEFCC) and the Union Ministry of Health and Family Welfare, created the National Air Quality Index (NAQI), a tool that makes the availability of air quality data accessible and transparent. Also, the MoEFCC in the year 2017 notified Graded Response Action Plan (GRAP) in order to respond to pollution episodes across Delhi NCR. Unfortunately, despite all these efforts, our pollution sources have exponentially increased compared to our ability to mitigate them. The Odd-Even scheme, though successful during the first year it was implemented, has failed to repeat the result in subsequent years.

### **The model of Beijing**

Controlling air pollution needs systemic reforms and effective implementation. India needs to follow the footsteps of its neighbouring country China, which is the world's largest emitter of climate-warming greenhouse gases. Public anger about the deteriorating quality of air in Beijing forced the Chinese government to lockdown and cancel coal plants in and around the city, build a nationwide network of air quality monitors, control vehicular emissions and establish global standards for it. Concerted action along with focused implementation resulted in dramatic improvement in the air quality of Beijing.

### **CSR for solutions**

There is an urgent need for Delhi and its nearby regions to switch to cleaner and renewable sources of energy for both industry and transport. India has the advantage of corporate social responsibility (CSR) which is mandated by law. The corporations can earmark some of their 2% corpus and use it for preventive and curative measures. Corporations can leverage GRAP and Air Quality Indexes by partnering with state governments and working with civil society organizations to spread awareness about air pollution.

As a solution to stubble burning, the respective state governments can issue subsidies and incentives for farmers and encourage them to use less polluting techniques or could help them in procuring the machinery to do so. The corporations can as part of their CSR activity fund technology incubators and research institutions to develop technology to address the issue of crop stubble.

Last year's smog episodes had been the worst and despite the health emergency – all that the respective governments indulged in were few sporadic measures and the blame game. The year 2020, seems no different so far, for the governments have already begun their annual display of passing the parcel.

'Who Dunnit?' works marvellously as a literary tool for movies but not in real life. Rhetorics cannot blind the facts anymore and neither do we have the luxury to do so. The problem can definitely be solved, all we need is the will and imagination to do.

#### **4.6 Haze engulfs Delhi, air quality worsens due to dust cover**

**Source:** timesofindia.indiatimes.com, 24 May, 2021



**A thick haze covered the capital on Sunday morning and visibility dropped to 600 metres from 8am to 9am at the Safdarjung observatory due to high concentration of dust in the air**

NEW DELHI: A thick haze covered the capital on Sunday morning and visibility dropped to 600 metres from 8am to 9am at the Safdarjung observatory due to high concentration of dust in the air. This sent Delhi's air quality, which was "satisfactory" and even "good" over the last three days, into the "poor" category.

Met officials said the haze was triggered by a western disturbance trough and strong southwesterly winds. The dust-raising winds caused advection of dust — transfer of matter by the flow of a fluid, especially horizontally in atmosphere — from southwest Rajasthan.

Kuldeep Srivastava, scientist at India Meteorological Department (IMD) and head of Regional Weather Forecasting Centre, said, “Some parts in west Rajasthan received less rainfall in the past few days. Due to a western disturbance trough and southwesterly winds, the dust was transported from Rajasthan to south Haryana and Delhi-NCR, affecting the visibility.” Besides the dust, low temperatures that slow down the dispersion of pollutants also made the air quality “poor”, he added.

Delhi’s overall air quality index (AQI) on Sunday was 237 as against 94 in the “satisfactory” category on Saturday, according to Central Pollution Control Board. However, the air quality is expected to improve from Monday.

System of Air Quality and Weather Forecasting and Research, a central forecasting body, said, “High winds and better ventilation are forecast for the next three days.

Hence, AQI is likely to improve to ‘moderate’ category on Monday and may improve further in the ‘moderate’ category on May 25 and 26.” The maximum temperature on Sunday was 33.5 degrees Celsius, six degrees below normal, while the minimum temperature settled at 22.4, four notches below normal.

IMD says the mercury will start rising from Monday. The maximum and minimum temperatures are likely to be 36 and 21 degrees Celsius, respectively. Strong surface winds at 20-25kmph are predicted for the next two days. “As the influence of a western disturbance will be over, the mercury will start rising. The maximum temperature may touch 39 degrees Celsius by May 29,” said a Met official.

#### **4.7 World Environment Day 2021: Pollution will rebound, warns CSE**

**Source:** [downtoearth.org.in](https://downtoearth.org.in), 4 June, 2021

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Pollution in spring 2021 (January-March) higher than since 2019

Pollution levels dropped during two hard lockdowns ('20, '21); but not during 2021 semi lockdown

April-May 2021 dirtier than a year ago



### **Heavy smog over Delhi**

During 2020-21 winter, at least 14 new hotspots (higher seasonal average than mean) in Delhi-NCR

Three locations each added as hotspots in Gaziabad and Gautam Buddha Nagar (Noida).

Number of 'severe' and 'severe-plus' days stabilized in 2020; but more 'poor' days

These were revealed by the Centre for Science and Environment (CSE) June 4 in its analysis of air quality trends through the novel-coronavirus disease (COVID-19) pandemic in Delhi and the National Capital Region (NCR).

The assessment by the Delhi-based thinktank during September 2018-May 2021 captured three successive winter, pre-pandemic and during the pandemic and during different stages of lockdown.

This reaffirms that while there has been substantial drop in particulate matter (PM)<sub>2.5</sub> levels during both the hard lockdown phases in March to May in 2020 and April-June, 2021 with nearly similar levels evoking

imagery of blue sky, the early months of 2021 or the spring time has witnessed worsening.

“This indicates that despite the partial restrictions the pollution level have increased. While the reason needs investigation, it is important to underscore that there would be a rebound effect with full opening of the economy and intensification of traffic. Pandemic management during the second wave may have slowed down action but this has to speed up to prevent the rebound effect or retaliatory emissions to ensure longer term air quality gains”, said Anumita Roychowdhury, executive director-research and advocacy, CSE, and the head of its sustainable urbanisation, air pollution and mobility programmes.

This is particularly important given the new science on the linkage between air quality and its effect on vulnerability to the pandemic.

“The key highlight is that the spring time – January to March, when pollution level begins to subside after winter, PM2.5 this year has recorded highest seasonal levels compared to the corresponding period in preceding years including the normal year of 2019,” said Avikal Somvanshi, programme manager at CSE’s Urban Lab team of the Sustainable Cities programme.

#### **4.8 India’s poor face disproportionately higher risk of dying from air pollution than the rich — study**

**Source:** theprint.in, 28 July, 2021

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Bengaluru: A new study has found that the mortality risk from indirect sources of air pollution other than vehicles and industrial emissions falls disproportionately on lower-income households in India.

Indian households are a known contributor to high levels of particulate matter PM2.5, primarily due to biomass cooking stoves. Cooking stoves contribute to indoor or household air pollution (HAP).

The study, published in the journal Nature Sustainability Monday, states that mortality risk from air pollution is an order of magnitude or ten times higher for poorer individuals and families.

The study further compared contributions to pollution by income decile groups or from the poorest 10 per cent to the richest 10 per cent of the population. The team found that high-income, urban Indian households produce a majority of ambient or outdoor air pollution through vehicle emissions, electricity generation, industries, and manufacturing, but the



health risks are still shouldered more by lower-income households who do not contribute much to it. “This indicates that despite the partial restrictions the pollution level have increased. While the reason needs investigation, it is important to underscore that there would be a rebound effect with full opening of the economy and intensification of traffic. Pandemic management during the second wave may have slowed down action but this has to speed up to prevent the rebound effect or retaliatory emissions to ensure longer term air quality gains”, said Anumita Roychowdhury, executive director-research and advocacy, CSE, and the head of its sustainable urbanisation, air pollution and mobility programmes.

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The authors of the study ask to enforce emission controls in an industry-wide manner, including through the use of clean cooking fuels in India.

### **What is HAP**

HAP is a major source of PM<sub>2.5</sub>, particles or pollutants that are less than 2.5 microns in width. In the long-term, exposure to PM<sub>2.5</sub> particles can lead to lung diseases, heart disease, and even cancer, and the pollutants can cause irritation to eyes, nose, and respiratory tract. Previous studies have shown that up to 98 per cent of Indian children might be exposed to high and unsafe levels of HAP.

But despite the high prevalence of HAP, its contribution to overall outdoor pollution is only about 40 per cent compared to other sources from urban households in India. India has 35 cities among the top 50 most polluted cities in the world, thanks to outdoor air pollution from various sources as well as the country's unique topography which collects pollutants in the Himalayan region.

Experts have expressed concern in the past about the lack of monitoring levels of HAP in rural households across the country as well as the lack of cleaner cooking alternatives. In 2016, only 56 per cent of Indian households had access to LPG while the number today is 80 per cent. However, in a country India's size, the risk from HAP continues to remain extremely high.

The findings from the study add to a growing body of evidence about disproportionate contribution to air pollution by the rich, and disproportionate exposure and health risks among lower-income population groups globally.

### **4.10 Thick, Toxic Smog Envelopes Delhi as Temperature and Wind Speed Drop**

**Source:** science.thewire.in, 12 November, 2021

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New Delhi: New Delhi's air quality plummeted again on Friday, and a thick haze of toxic smog hung over India's capital due to a drop in temperature and wind speed, and a spike in the burning of crop waste in surrounding farmlands.

The haze reduced visibility and the air quality index (AQI) hit 461 on a scale of 500, according to the federal pollution control board. This level of pollution means the air will affect healthy people and seriously impact those with existing diseases.



**A metro train approaches Rithala metro station on a smoggy morning in Delhi, November 12, 2021**

The concentration of poisonous PM2.5 particulate matter averaged 329 micrograms per cubic meter of air. The government prescribes a “safe” PM2.5 reading at 60 micrograms per cubic meter of air over a period of 24 hours.

PM2.5 is small enough to travel deep into the lungs, enter the bloodstream and can cause severe respiratory diseases, including lung cancer.

“This is becoming a nightmare,” said Gufran Beig, founder project director of air quality and weather monitor SAFAR that falls under the Ministry of Earth Sciences.

“Fire counts are in the range of 3,000-5,000 and not declining,” Beig told Reuters, referring to crop stubble fires in the regions around the capital.

He said current severe conditions may ease by Saturday, but air quality would remain “very poor” until November 17.

Air quality might worsen if farm fires continued, as the SAFAR model forecasts calm wind conditions, Beig said.

India's efforts to reduce crop-waste burning, a major source of air pollution during winter, by spending billions of rupees over the past four years have done little to avert a sharp deterioration in air quality.

Delhi, often ranked the world's most polluted capital, faces extremely bad air in winter due to the crop stubble burning, emissions from transport, coal-fired plants outside the city and other industrial emissions, open garbage burning and dust.

Residents of Delhi endured this year's worst air on November 5, a day after revellers burnt firecrackers during the Diwali festival, as AQI levels surged to 463 on a scale of 500.

Vehicular emissions contributed more than half of Delhi's particulate pollution between October 24-November 8, the Centre for Science and Environment think tank said in its report published on Thursday.

#### **4.11 Smog engulfs Patna, AQI turns 'very poor'**

**Source:** timesofindia.indiatimes.com,29 November,2021

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PATNA: People of Patna woke up to a layer of smog engulfing the city and the air quality plunging to the "very poor" category on Sunday. Particulate matters (PM) 10 and 2.5 continued to remain the lead pollutants in the atmosphere. The Central Pollution Control Board (CPCB) recorded air quality index (AQI) level of Patna at 342 at 4pm on Sunday. It was by far the highest AQI registered in the state capital in November this year. The city has witnessed four "very poor" AQI days, 21 "poor" days and three "moderate" days this month.

Data from individual areas having continuous ambient air quality monitoring station showed five of them falling in the "very poor" category, including Planetarium (394), BIT-Patna (391), Eco Park (386), S K Memorial Hall (344) and DRM office-Khagaul (340). Only Patna City's station was in "moderate" category with the AQI level of 200.

An AQI below 50 is classified as "good", between 51 and 100 "satisfactory" and between 101 and 200 "moderate". "Poor" air ranges from 201 to 300, "very poor" from 301 to 400 and "severe" from 401 to 500. "Very poor" air quality may cause respiratory illness to the people on prolonged exposure. The effects may be more pronounced in people with lung and heart diseases.

As per the CPCB bulletin, the average PM10 (less than 10 microns) was recorded at 344 and PM 2.5 (less than 2.5 microns) at 394. The emergency threshold is when PM10 concentrations cross 500ug/m<sup>3</sup> and PM2.5 300ug/m<sup>3</sup>.

The Air Quality Early Warning System of the ministry of earth sciences, a forecasting agency, has predicted that the situation may slightly improve in Patna, but the AQI will remain in the “very poor” category due to meteorological conditions highly unfavourable for dispersion of pollutants till November-end.

Ashok Ghosh, chairman of Bihar State Pollution Control Board, said early onset of winter led to early formation of thermal inversion and it is one of the main reasons for the deterioration in AQI level. “Increase in vehicular movement and bursting of firecrackers during marriages are also responsible for the rise in AQI level. The wind is getting trapped over Patna and adjoining areas due to climatic reasons and pollution is also concentrated over this region, leading to the rise in AQI recordings,” he said.

“The climate action plan will be implemented strictly in the districts as the Bihar chief secretary held a meeting with the secretaries of departments of building construction, road construction, urban development and housing department and environment, forest and climate change in this regard. The state has to strictly follow the plan for at least 3-4 years for better results,” Ghosh said.

Meanwhile, Chhapra’s AQI was recorded in “severe” category at 431 on Sunday, Siwan (426), Sasaram (401), Bhagalpur (291), Darbhanga (331), Gaya (290), Hajipur (326), Katihar (338), Kishanganj (243), Motihari (339), Muzaffarpur (313), Purnia (315) and Rajgir (359).

## 5. Wildfire



A wildfire is an uncontrolled fire that burns in the wildland vegetation, often in rural areas. Wildfires can burn in forests, grasslands, savannas, and other ecosystems, and have been doing so for hundreds of

millions of years. They are not limited to a particular continent or environment.



### **Causes:**

Wildfires can start with a natural occurrence—such as a lightning strike—or a human-made spark. However, it is often the weather conditions that determine how much a wildfire grows. Wind, high temperatures, and little rainfall can all leave trees, shrubs, fallen leaves, and limbs dried out and primed to fuel a fire. Topography plays a big part too: flames burn uphill faster than they burn downhill.

### **Effects:**

- Fires that rage out of control have many devastating effects on human, animal, and plant life.
- Smoke from large fires negatively affects air quality and can damage the lungs of people thousands of miles away. Wildfire also threatens water quality, destroys animal habitat, and leaves behind stripped land that can easily become eroded and create mudslides.
- Wildfires also burn up the carbon stored in trees and soil, releasing large amounts of smoke, methane, and carbon dioxide into the atmosphere, which increase overall temperatures.
- Forests eventually recover from wildfires, but it can take a long time.

## **5.1 Winter wildfires in Uttarakhand gut 5,000 trees**

**Source:** timesofindia.indiatimes.com, 5 January, 2021



**Several fruit orchards caught fire in the blaze originating in forests**

DEHRADUN: In Uttarakhand, the months of November, December and January are meant for clearing the fire lines in the forests for tackling summer wildfires. But this year, the frontline force was busy dousing the flames even during the winter months. It was alleged that

some tourists had carelessly lit campfires resulting in increased incidents of forest fires due to conducive atmosphere for the fires.

Since most of the forest floor was covered in dry pine needles and biomass due to the dry winter months, it aided the spread of fires.

In the period between October-December last year, the state lost over 5,600 trees in around 235 wildfire incidents, and controlling these fires caused a loss of Rs 9.71 lakh to the exchequer. In all, maximum forest cover has been devastated in Pauri (115.6 hectares), Almora (61.5 hectares), Bageshwar (47.27 hectares), Uttarkashi (38.8 hectares), Pithoragarh (22.6 hectares) and Rudraprayag (8.5 hectares).

In the summer months last year, there were very few fire incidents as people didn't venture into the forest due to Covid lockdown, and rains were scarce. All these factors together led to accumulation of a lot of dry biofuel – primarily pine needles on the forest floor leading to fires during winters,” said Man Singh, chief conservator of forests (forest fires), Uttarakhand.

The blaze is now causing losses to villagers. “I have lost over two dozen expensive apple trees of my orchard, which I had imported from Italy,” said Vijaypal Chand of Matkunda village in Bironkhal. Other villagers also claimed that their fruit orchards caught fire in the blaze which had originated from forests.

According to Man Singh, the high incidents of fires are being reported since “there is some kind of periodicity in forest fires.” “After a few years’ gap, forest fires are being reported in large numbers and it is quite possible that the summer this year might witness more fires. We are already gearing up to tackle the blaze,” he said.

Meanwhile, another DFO from the hills blamed migrants who have returned home from the cities for the increase in the fires. “We know of incidents wherein these unemployed migrants have gone inside the forest for leisure and lit campfires at different spots. This is sad and irresponsible,” said the DFO.

## **5.2 Odisha Wildfire: Raging Simlipal Forest Fire Under Control, No Loss of Life Reported**

**Source:** weather.com, 4 March, 2021

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A massive wildfire at the Simlipal National Park in Odisha, which was raging for around a week, has been brought under control. The authorities said

that no loss of life or injury to wildlife, villagers or public property has been reported so far.



Simlipal is a national park and tiger reserve situated in Odisha's Mayurbhanj district. The 2,750 sq km area harbours unique melanistic tigers, rare and endemic orchids, 1,352

species of plants, 55 species of mammals, 361 species of birds, 62 species of reptiles and 21 species of amphibians.

A massive fire had broken out in the biosphere reserve area of the park in February.

"The fire is under control, no loss or injury to wildlife, any staff, villagers or public property has been reported," the Director General of National Tiger Conservation Authority, S.P. Yadav, told IANS.

All the forest fires are recorded as the ground fire in the deciduous Sal forest of Simlipal Tiger Reserve, he said. The DG further claimed that the forest fire season in Simlipal Tiger Reserve usually starts in February and continues till May.

Almost all the cases of fire are anthropogenic in nature. Out of these, maximum cases are to facilitate the growth of succulent grass for domestic cattle, collection of non-timber forest products (NTFP) like 'Mahua' and eradication of ticks and insects, he asserted. Various measures were taken to bring the fire under control like creation of temporary fire lines through cleaning of leaf litter and ground flora and engagement of additional manpower as a fire watcher in addition to the existing protection squad.

Besides this, leaf blowers and personal safety equipment for firefighting were procured, additional vehicles for mobilisation of fire squads were arranged and awareness drives were carried out among the fringe villagers. Simlipal comes under the Deccan Peninsular Biographic zone, Chhotangpur Province, in the Mahanadian region. The forest is a predominantly moist-mixed deciduous forest with tropical semi-evergreen patches in areas with

suitable microclimatic conditions and sporadic patches of dry, deciduous forest and grassland.

On March 2, Union Forest Minister Prakash Javadekar had directed the concerned officials to take immediate steps to control the wildfire. He had issued directions in response to a tweet by Union Petroleum Minister Dharmendra Pradhan on the issue. Javadekar has sought a report on the forest fire from the concerned authorities.

### **5.3 Wildfire in Mizoram spreads to six districts**

**Source:** telegraphindia.com, 27 April, 2021

Six of Mizoram's 11 districts have been affected till Monday evening in a forest fire that was first spotted in Lunglei district on Saturday morning prompting a massive dousing operation involving community volunteers, police and security personnel.

Government officials and volunteers said it was perhaps one of the worst wildfires to have hit the state, prompting Mizoram chief minister Zoramthanga to seek the help of the Indian Air Force to douse the fire which is still raging at a few places.



**The massive forest fire below the Chanmari area of Lunglei town on Saturday night**

Under-secretary in the disaster management and rehabilitation department, Malsawmtluanga Fanchun, told The Telegraph that preliminary reports from

the six affected districts — Champhai, Hnahthial, Lunglei, Lawngtlai, Khawzawl and Serchhip — reveal that about 5,789.5 acres of forest area has been destroyed in the forest fire.

Though there has been no loss of life, 11 firefighters have suffered injuries till now. Over 85 per cent of Mizoram's total area is covered by forests, making wildfires quite common, especially during the dry season. This year, Nagaland, Manipur and Arunachal Pradesh too have reported massive forest fires. The devastation caused in Mizoram is unprecedented, Malsawmtluanga said.

The fire has affected 53 villages, destroyed 14 houses (12 completely), killed 20 domestic animals and forced 60 of the 83 affected persons to shift to relief camps, the senior official said based on the preliminary reports from the districts. "A clear picture of the worst affected districts will emerge by tomorrow (Tuesday). Fire is still raging in some areas. Apart from the fire, we are also fighting Covid. These are very testing times for all of us," Malsawmtluanga said.

Prime Minister Narendra Modi called up Zoramthanga to take stock of the situation while assuring all possible support from the Centre in overcoming this crisis. "We all pray for the safety and wellbeing of the people of Mizoram," Modi said. Zoramthanga had tweeted on Sunday night about the wildfire affecting multiple locations in the state, adding: "Keep us in your prayers!" He had earlier spoken to the IAF authorities, explaining the extreme urgency of the situation. The IAF responded by deploying two Mi-17V5 helicopters, equipped with Bambi bucket, to douse the fire in Lunglei district and adjoining areas.

Bambi bucket are filled from nearby waterbodies by the choppers and used to spray water to douse the fire in the affected areas. An IAF official said two choppers reached Lunglei and one of them did a recce with the deputy commissioner on board. "No flame was reported. Only smoke was observed at two places for which Bambi bucket ops has begun," he said.

Apart from local volunteers, the Assam Rifles and Border Security Force (BSF) have also stepped out with their men and equipment, and are actively participating in the fire-fighting efforts.

Private water tankers have also voluntarily deployed their vehicles for fire-fighting. A government statement on Sunday had said the fire has been raging "non-stop" for the past 32 hours around Lunglei town in south Mizoram. The fire was first reported around 7am on Saturday mainly in "uninhabited" forest areas surrounding Lunglei, and has spread to more than 10 village council areas within the town.



“In some localities such as Zotlang, Serkawn, Chanmari, the fire reached some buildings, but could be contained and doused before it caused any major loss to property. No loss of human life has yet been reported due to the wildfire,” the statement said. Lunglei is around five hours’ drive from the capital Aizawl.

Dry vegetation due to drought-like conditions, coupled with strong winds, has made the mission of dousing the forest fire extremely challenging, and the unfriendly terrain of the area also poses a very serious risk and hindrance for the fire-fighters, the statement said. Lunglei deputy commissioner and District Disaster Management Authority (DDMA) chairman Kulothungan A had convened an emergency meeting with key stakeholders in his office on Sunday. A probe is also on to find out what or who caused the fire. “There are reasons to believe that the fire is manmade. A meeting will be convened with village councils and Young Mizo Association (YMA) leaders of the affected areas to ascertain the exact cause,” an official in Lunglei said.

## **6. Sand or Dust Storms/Thunderstorms**



Sand and dust storms are common meteorological hazards in arid and semi-arid regions. They are usually caused by thunderstorms – or strong pressure gradients associated with cyclones – which increase wind speed over a wide area. These strong winds lift large amounts of sand and dust from bare, dry soils into the atmosphere, transporting them hundreds to thousands of kilometres away.

## **Impacts on human health**

Airborne dust presents serious risks for human health. Dust particle size is a key determinant of potential hazard to human health. Particles larger than 10 µm are not breathable, thus can only damage external organs – mostly causing skin and eye irritations, conjunctivitis and enhanced susceptibility to ocular infection. Inhalable particles, those smaller than 10 µm, often get trapped in the nose, mouth and upper respiratory tract, thus can be associated with respiratory disorders such as asthma, tracheitis, pneumonia, allergic rhinitis and silicosis. However, finer particles may penetrate the lower respiratory tract and enter the bloodstream, where they can affect all internal organs and be responsible for cardiovascular disorders.

## **Impacts on the environment and society**

Surface dust deposits are a source of micro-nutrients for both continental and maritime ecosystems. Saharan dust is thought to fertilize the Amazon rainforest, and dust transports of iron and phosphorus are known to benefit marine biomass production in parts of the oceans suffering from the shortage of such elements. But dust also has many negative impacts on agriculture, including reducing crop yields by burying seedlings, causing loss of plant tissue, reducing photosynthetic activity and increasing soil erosion.

Indirect dust deposit impacts include filling irrigation canals, covering transportation routes and affecting river and stream water quality. Reductions in visibility due to airborne dust also have an impact on air and land transport. Poor visibility conditions are a danger during aircraft landing and taking off – landings may be diverted and departures delayed. Dust can also scour aircraft surfaces and damage engines. Dust can impact on the output of solar power plants, especially those that rely on direct solar radiation. Dust deposits on solar panels are a main concern of plants operators. Keeping the solar collectors dust-free to prevent particles from blocking incoming radiation requires time and labour.

### **6.1 Goa: Unheard of in winter, hailstones, thunderstorms surprise scientists**

**Source:** [timesofindia.indiatimes.com](https://timesofindia.indiatimes.com), 22 February, 2021

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PANAJI: The hail and thunderstorm over the weekend, unheard of in Goa in winter, has surprised scientists and meteorologists even as unusual weather events increase in frequency in the state.



### **Last week, some places in the state also experienced hailstones**

“Thunderstorms stop once monsoon sets in. To the best of my knowledge, this type of event has never occurred in the winter season in Goa,” said M R Ramesh Kumar, meteorologist and chief scientist (retd), National Institute of Oceanography (NIO), Goa.

Smog, hail and dust storms are either rare, or as special weather events, not reported in the state. While squalls develop during June and July, thunderstorms occur on either side of the southwest monsoon season during May and October. A combo effect of two troughs at 1km and 6km triggered the unseasonal cloud formation, disrupting the first spell of a mild chill after the warmest January in three decades.

On Friday, many rain-gauge centres, especially Sakhali, Quepem, Sanguem and some others recorded moderate rainfall. But what baffled scientists was the widespread thunderstorm and a shower of hail in Quepem and Shiroda.

Another rarity during winter — vertical cloud formation — triggered the twin events in February. The ‘wonder’ clouds literally stood from a few kilometres above the earth to thousands of feet into the sky instead of being carpeted across. “Vertically-developing clouds like Cumulonimbus can stretch up to the top of the troposphere (tropopause) up to about 15km to 16km in height in some cases,” the former NIO scientist said.

The atmospheric height at which the temperature drops to zero level — called zero degree isotherm — is conducive to ice formation in moist conditions, which were ensured by the two troughs, Rahul M, scientist, India meteorological department (IMD), Panaji, said. “In winter months, usually the zero degree isotherm is slightly lower, and even cloud heights of 8km-10kms are enough for ice to form. As it falls to earth, the ice particles don’t get enough time to melt,” the IMD scientist stated. After a few cyclonic and other weather events, scientists view this episode with interest. “It looks as if there is a substantial change in the weather pattern this year, anomalous rain in winter, thunderstorms and hail,” Kumar said.

## **6.2 Delhi, other parts of North India to see more dust storms till Thursday, says IMD**

**Source:** [indiatoday.in](http://indiatoday.in), 31 March, 2021



**Visitors at the India Gate during dusty weather, in New Delhi, March 30**

Delhi was hit by a dust storm on Tuesday which reduced visibility and resulted in a dip in temperature.

According to the India Meteorological Department (IMD), most of the North, northwest and northeast India are likely to see above-normal maximum temperatures till May.

"During the upcoming hot weather season (March to May), above normal seasonal maximum temperatures are likely over most of the subdivisions of

north, northwest and northeast India...," the IMD noted in its 'Seasonal Outlook for Temperatures'.

The dusty weather is expected to continue on Wednesday as well and prevail till Thursday. "Dust raising strong surface winds (speed reaching 30-40 kmph) are very likely over Rajasthan, Punjab, Haryana, Delhi and Uttar Pradesh during March 30th March-April 1," IMD said.

### **Hottest day in 76 years**

Delhi saw its hottest day in March in 76 years on Monday, as per the India Meteorological Department said. Reeling under a "severe" heatwave on the day of Holi, the maximum temperature shot up to 40.1 degrees Celsius in Delhi.

The Safdarjung Observatory, which provides representative data for Delhi, recorded a maximum temperature of 40.1 degrees Celsius, eight notches more than the normal, said Kuldeep Srivastava, the head of the IMD's regional forecasting centre.

"It was the hottest day in March since March 31, 1945, when Delhi recorded a maximum of 40.5 degrees Celsius," he said.

"Low wind speed and plenty of sun due to clear skies over the last three to four days led to high temperatures," Srivastava said. Delhi had recorded a maximum of 39.6 degrees Celsius on March 29, 1973, the third hottest day in March.

The weather stations at Najafgarh, Narela, Pitampura and Pusa recorded maximum temperatures of 41.8 degrees Celsius, 41.7 degrees Celsius, 41.6 degrees Celsius, and 41.5 degrees Celsius, the IMD said.

According to Skymet Weather, strong dust-raising winds from the West and northwest direction are expected to continue over Punjab, Haryana, North Rajasthan, Delhi, Uttar Pradesh, Jharkhand and Bihar for a few days. Winds are expected to subside by April 2 evening, it said.

### **What is heat wave?**

For the plains, a "heatwave" is declared when the maximum temperature is more than 40 degrees Celsius, and at least 4.5 notches above normal. A "severe" heatwave is declared if departure from normal temperature is more than 6.5 degrees Celsius, according to the IMD.

### **No let-up in heat wave conditions in Odisha**



There seems to be no respite from heat wave condition in Odisha as at least 17 stations recorded temperature above 40 degrees Celsius and Baripada town becoming the hottest place in the state with the mercury touching 44.6 degrees Celsius on Tuesday, according to the weather department. The twin cities of Cuttack and Bhubaneswar recorded a maximum temperature of 40.5 and 39.8 degrees Celsius.

Meanwhile, the India Meteorological Department (IMD) has said the maximum temperature (day temperature) is likely to rise by around 2 degrees Celsius during the next 48 hours and it will slide by 2-3 degrees after three days in the districts of Odisha. The IMD issued a yellow warning for the next three days in 20 of the state's 30 districts.

### **6.3 Punjab: Dust storm, rain hit wheat crop in 4 districts, yield to fall**

**Source:** indianexpress.com, 8 April, 2021

A dust storm followed by rain hit several areas of Punjab Tuesday night affecting standing crop over 11,645 hectares in at least 4 districts. The storm, said experts, is likely to hit crop yield in the affected area by 2 to 3 per cent.



**A farmer clears the weeds from the portion of wheat field flattened after incessant rain and high-velocity wind at village Ayali Kaln in Ludhiana**

According to a report compiled by the Department of Agriculture, the districts where crop has been affected are Ludhiana, Fatehgarh Sahib, Bathinda and Mohali. This damage is to crop covering 0.33% of the total area under wheat in Punjab, said the report.

Meanwhile in Ludhiana, the damage is the maximum as 6,275 hectare area under wheat has been affected in patches, the report said, adding that the yield may be affected by 1 to 1.5 per cent in this area.

Bathinda comes at number 2 where 4,780 hectare area under wheat has been affected and loss of yield can be in the range of 2-3 per cent, while in Fatehgarh Sahib, dust storms and rain affected 500 hectare area under wheat due to which loss of yield in the crop can be in the range of 3-4 per cent says the report of agriculture department. In Mohali, 90 hectare area under wheat has been affected which can cause a loss of yield in the range of 1-2 per cent.

It rained only 1.4 mm on April 7 in Bathinda and hence dust storms with high velocity were more damaging, said experts. Many trees and even electricity poles were uprooted across the state. Jagsir Singh Jhumba, district committee member of BKU (Ugrahan) of Bathinda district said, "Farmers picked trees from Raika feeder canal, Nandgarh-Badal branch of Sirhind canal and another branch of Sirhind canal going towards Doomwali village on their own as the canal department never turned up on time... we kept on cleaning the blocked canal on our own."

Bitty Singh from Baho village said, "Department officials never came to the spot till 10 am and we started clearing up canals from 4 am onwards. Crops which were sown after harvesting cotton were still green and hence they have suffered damage the most."

Jagsir added, "Many villages are without power and we have no idea as to when will power be restored. My village Jhumba is one among them."

SAD President Sukhbir Singh Badal also visited many villages of Bathinda and adjoining areas to talk to the farmers. He demanded immediate girdawari of the damaged area so as to compensate the farmers. Sukhbir visited village Ghudda where he saw flattened wheat fields. Sukhbir said, "Immediate girdawari needs to be done to assess the loss, hence Punjab CM should issue orders to all the DCs of Punjab to send the report soon."

It rained 2 mm in Fatehgarh Sahib, while in Ludhiana it rained 4.5 mm. In Mohali, it rained 2.8 mm while 1.4 mm in Bathinda. Maximum rain happened in Muktsar, which was 5.1 mm, followed by Barnala at 5.0 mm. However, in Muktsar and Barnala, no damage to crops has been mentioned

by the Department of Agriculture. Overall, average rainfall in the state was 2.5 mm.

Gurvinder Singh, Joint Director, Department of Agriculture, said, "It affected only 0.33 per cent of the total area under wheat in Punjab and the damage is being assessed. It was only in 4 districts, overall weather did not affect crops much in Punjab."

Procurement of wheat is to start from April 10 in Punjab, so weather continues to worry farmers as they fear for their standing crops.

## **6.4 Dust Storm over Rajasthan to deter Heatwave conditions**

**Source:** skymetweather.com, 11 May, 2021

The state of Rajasthan and in that too West Rajasthan is likely to be raided by dust storms for the next 2 days between 10th and 11th May. East Rajasthan is expected to pick up stormy conditions on 11th May and later. North Rajasthan has already witnessed mild convective thunderstorms during the past 24 hours wherein Ganganagar, Suratgarh, Hanumangarh, and Anupgarh experienced squally conditions and light rain at isolated places.



Southwest Madhya Pradesh and North Gujarat have been the hottest region during the last 24 hours and West Rajasthan contiguous to these subdivisions have been another heat island in the proximity of border areas. Barmer, Jaisalmer, Phalodi, Nagaur, Jodhpur, and Pali have been the hottest with temperatures in excess of 42 degrees and Pali nearly touching

44 degrees to lead the table. This region is likely to have dust storm activity accompanied with squally winds kicking up dust in the air.

Western disturbance is moving across the northern parts with its induced cyclonic circulation over North Rajasthan and neighborhood. Winds from the Arabian Sea across Gujarat are feeding moisture to this feature, though limited in magnitude but good enough to kick up heat-triggered thunderstorms during the afternoon hours. Jaisalmer, Barmer, Churu, Phalodi, Bikaner, Jodhpur, Jalore, and Pali stand favourite for the pre-monsoon activity. Mercury levels will not be dented as most of the weather activity is expected during the late afternoon. Subsequent to this dusty spell, most parts of the state, particularly North and East Rajasthan can expect some relief showers on 12th May.

## **6.5 Heavy rains with dust storm bring mercury down in Delhi-NCR**

**Source:** dnaindia.com, 4 June, 2021



**Dust storms and dark clouds were witnessed in many areas of Noida, while mild to moderate showers were also reported from some places**

In a big relief to people living in Delhi-NCR, rains accompanied by strong winds lashed parts of the national capital region on Friday evening. The India Meteorological Department (IMD) had issued a notification earlier on Friday that Delhi-NCR will witness a thunderstorm with light to moderate-intensity rain with wind speed 40-60kmph in the evening.



Dust storms and dark clouds were witnessed in many areas of Noida, while mild to moderate showers were also reported from some places. The showers brought the mercury down, while strong winds brought some relief from the rising humidity.

Trees were uprooted near Windsor Place in Delhi following heavy rain and strong winds on Friday.

Bahadurgarh, Kharkhoda, Gohana, Gannaur, Tosham, Bhiwani, Charki-Dadri, Sonipat, Jhajjar, Faridabad, Ballabgarh, Manesar, Gurugram, Rewari, Bawal, Sohna, Nuh, Bhiwadi, Siwani, Loharu, Palwal, Hodal, Aurangabad, Tizara(Haryana), Baraut, Bagpath, Khekra, Jattari, Greater-Noida, Agra, Tundla (UP) and adjoining areas are likely to receive rainfall with a thunderstorm during the next two hours.

Heavy rains along with strong winds lashed parts of Delhi-NCR last week also. Trees were uprooted in some parts of the capital due to strong winds. The sudden rains brought relief to Delhiites bringing down the temperature in the capital.

## **6.6 Delhi-NCR hit by sudden dust storm and rains**

**Source:** hindustantimes.com,2 July,2021



**New Delhi experiences rainfall**



Rainfall lashed parts of the national capital on Friday afternoon bringing Delhiites a much-needed reprieve from the scorching heat. Delhi has been reeling under extremely high temperatures of over 40°C; the mercury peaked on Thursday, as Delhi recorded a maximum temperature of 43.1°C.

Regional Weather Forecasting Centre (RWFC), New Delhi, said thunderstorms accompanied by moderate to heavy rainfall and gusty winds was witnessed in the regions of Bahadurgarh, Faridabad, Ballabhgarh, Loni Dehat, Hindon AF Station, Ghaziabad, Indirapuram, Chhapraula, Noida, Dadri, Greater Noida) Narnaul, Mahendargarh, Kosali, Charkhi Dadri, Mattanhail, Hodal, Aurangabad, Palwal (Haryana) Baraut, Bagpat, Khekra, Modinagar, Hapur, Narora, Debai, Anupshahar, Jahangirabad, Shikarpur, Pahasu, Bulandshahar, Sikandrabad, Gulaoti.

“Thundershower with moderate to heavy intensity rain and gusty winds with speed of 40-60 Km/h would occur over and adjoining areas of most places of Delhi & NCR,” RWFC tweeted on Friday evening.

The agency also predicted rainfall in Tundla, Hathras, Iglas, Aligarh, Khair, Gabhana, Atrauli, Jattari, Khurja of Uttar Pradesh in the next 2 hours.

Delhi witnessed a heatwave on Wednesday as dry hot westerly winds from central Pakistan were blowing over the national capital and other parts of northwest India at the speed of 20 to 30 kilometres per hour.

The Indian Meteorological Department (IMD) has warned that due to these winds heat wave conditions are most likely to prevail over some parts of Punjab, Haryana, Chandigarh, Delhi, Rajasthan, and West Uttar Pradesh till the end of the week. IMD has also predicted that the monsoon which usually sets in on June 27 will be delayed this year till July 7.

## 7. Volcanic Eruption and Earthquake



Earthquakes related to volcanic activity may produce hazards which include ground cracks, ground deformation, and damage to manmade structures.

### **Types:**

There are two general categories of earthquakes that can occur at a volcano: volcano-tectonic earthquakes and long period earthquakes.

Earthquakes produced by stress changes in solid rock due to the injection or withdrawal of magma (molten rock) are called volcano-tectonic earthquakes (Chouet, 1993).

These earthquakes can cause land to subside and can produce large ground cracks. These earthquakes can occur as rock is moving to fill in spaces where magma is no longer present. Volcano-tectonic earthquakes don't indicate that the volcano will be erupting but can occur at anytime. The second category of volcanic earthquakes are long period earthquakes which are produced by the injection of magma into surrounding rock. These earthquakes are a result of pressure changes during the unsteady transport of the magma.

When magma injection is sustained a lot of earthquakes are produced (Chouet, 1993). This type of activity indicates that a volcano is about to

erupt. Scientists use seismographs to record the signal from these earthquakes. This signal is known as volcanic tremor.

## **7.1 Magnitude 6 earthquake strikes India**

**Source:** 9news.com.au,28 April,2021

A magnitude 6 earthquake has struck the state of Assam in India, the US Geological Survey has reported.

The state is in the north-east of the country, south of the Himalayas. The USGS said the quake hit at a depth of 34 kilometres, with the epicentre just 11km from the town of Dhekiajuli.



### **An earthquake has struck in north-east India**

There have been reports of damage and casualties but no official information released.

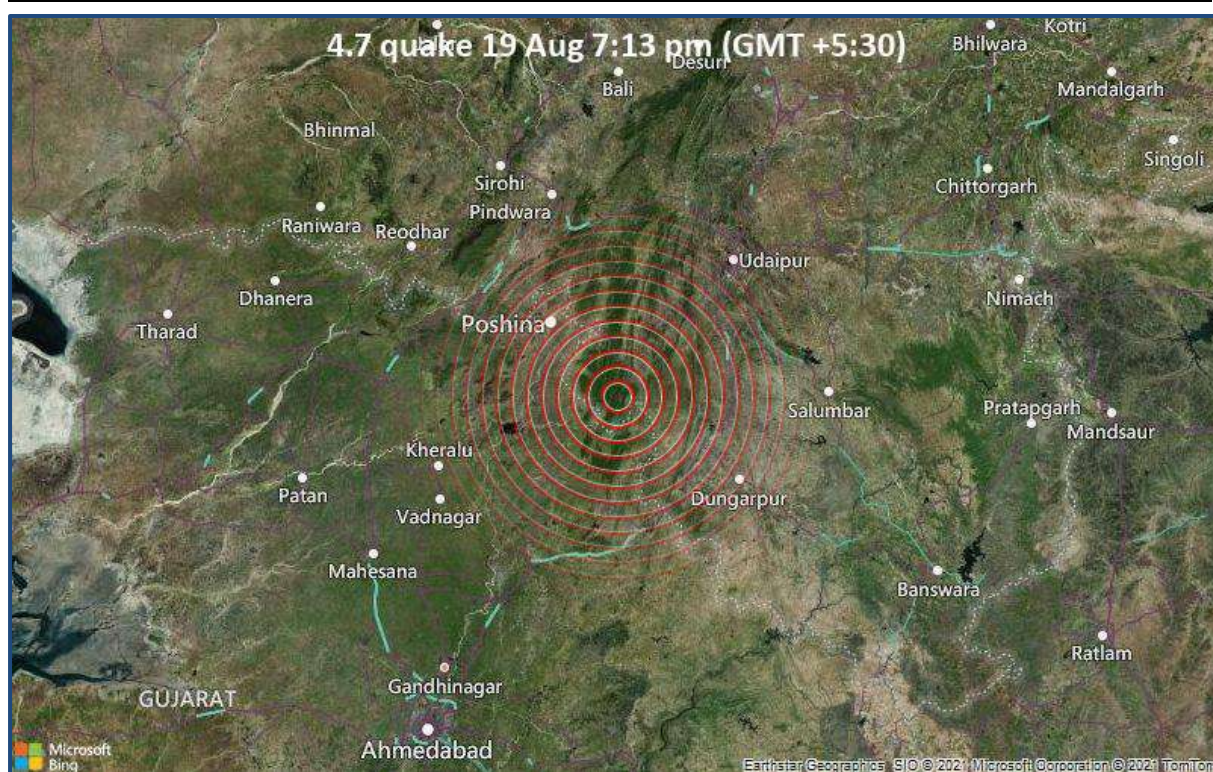
Images posted to Twitter showed some damage to buildings in the state capital of Guwahati.

State MLA Ashok Singhal said that as yet there were no reports of casualties.



## 7.2 Magnitude 4.7 earthquake strikes near Khedbrahma, Sabar Kantha, Gujrat, India

**Source:** volcanodiscovery.com, 19 August, 2021



### 4.7 quake 19 Aug 7:13 pm (GMT +5:30)

A magnitude 4.7 earthquake near Khedbrahma, Sabar Kantha, Gujrat, India, was reported only 10 minutes ago by India's National Center for Seismology (NCS), considered the main national agency that monitors seismic activity in this part of the world. The earthquake occurred at a shallow depth of 10 km beneath the epicenter early evening on Thursday 19 August 2021 at 6:43 pm local time. The exact magnitude, epicenter, and depth of the quake might be revised within the next few hours or minutes as seismologists review data and refine their calculations, or as other agencies issue their report.

Based on the preliminary seismic data, the quake should not have caused any significant damage, but was probably felt by many people as light vibration in the area of the epicenter.

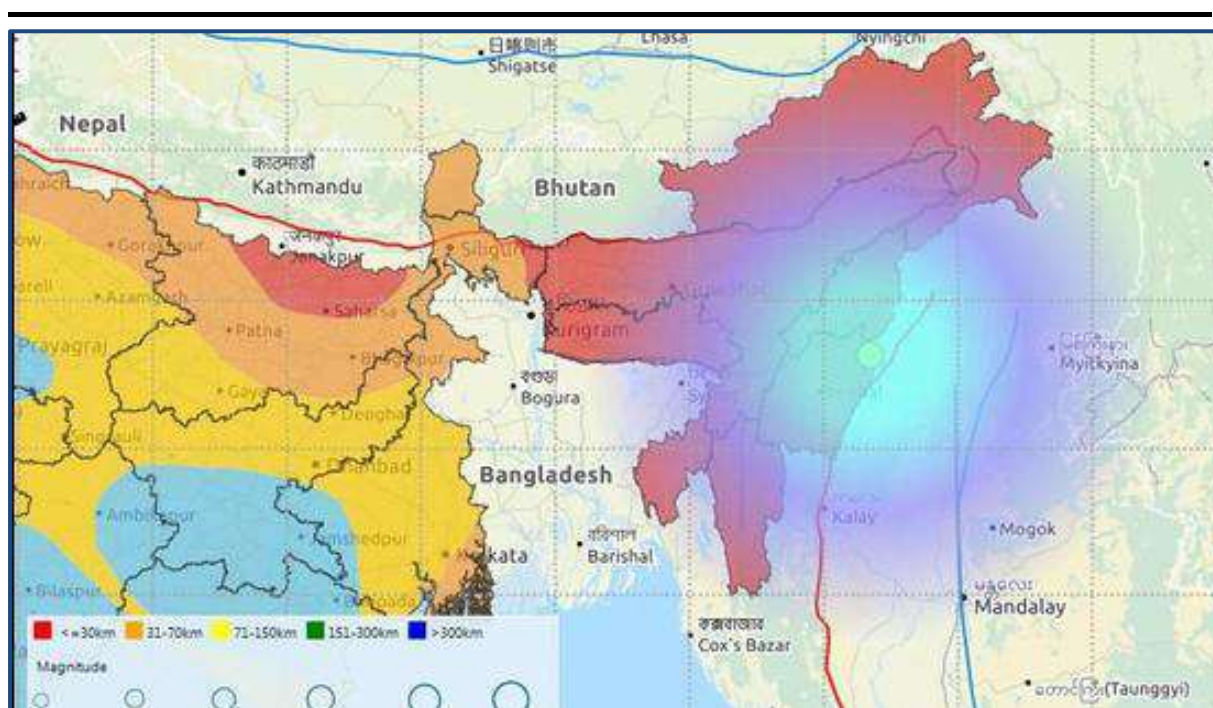
Weak shaking might have been felt in Khedbrahma (pop. 29,400) located 26 km from the epicenter, Dūngarpur (pop. 45,200) 55 km away, Ābu Road (pop. 50,300) 63 km away, Ahmednagar (pop. 60,600) 67 km away, Udaipur (pop. 422,800) 68 km away, and Modāsa (pop. 59,000) 74 km away.

Other towns or cities near the epicenter where the quake might have been felt as very weak shaking include Pālanpur (pop. 123,300) located 85 km from the epicenter.

VolcanoDiscovery will automatically update magnitude and depth if these change and follow up if other significant news about the quake become available. If you're in the area, please send us your experience through our reporting mechanism, either online or via our mobile app. This will help us provide more first-hand updates to anyone around the globe who wants to know more about this quake.

### **7.3 Magnitude 5 earthquake hits Manipur, no loss of life or property**

**Source:** hindustantimes.com,20 September,2021



**The earthquake originated at a depth of 82 km and had its epicentre around 31km from Shirui in Manipur's Ukhrul district, as per NCS data**

An earthquake measuring 5.0 on the Richter scale hit the northeastern state of Manipur at around 12.54 am on Monday, according to the National Centre for Seismology (NCS), ministry of earth sciences. The loss to life or property was reported in the aftermath of the quake, which originated at a depth of 82 km and had its epicentre around 31km from Shirui in Manipur's Ukhrul district, as per NCS data.



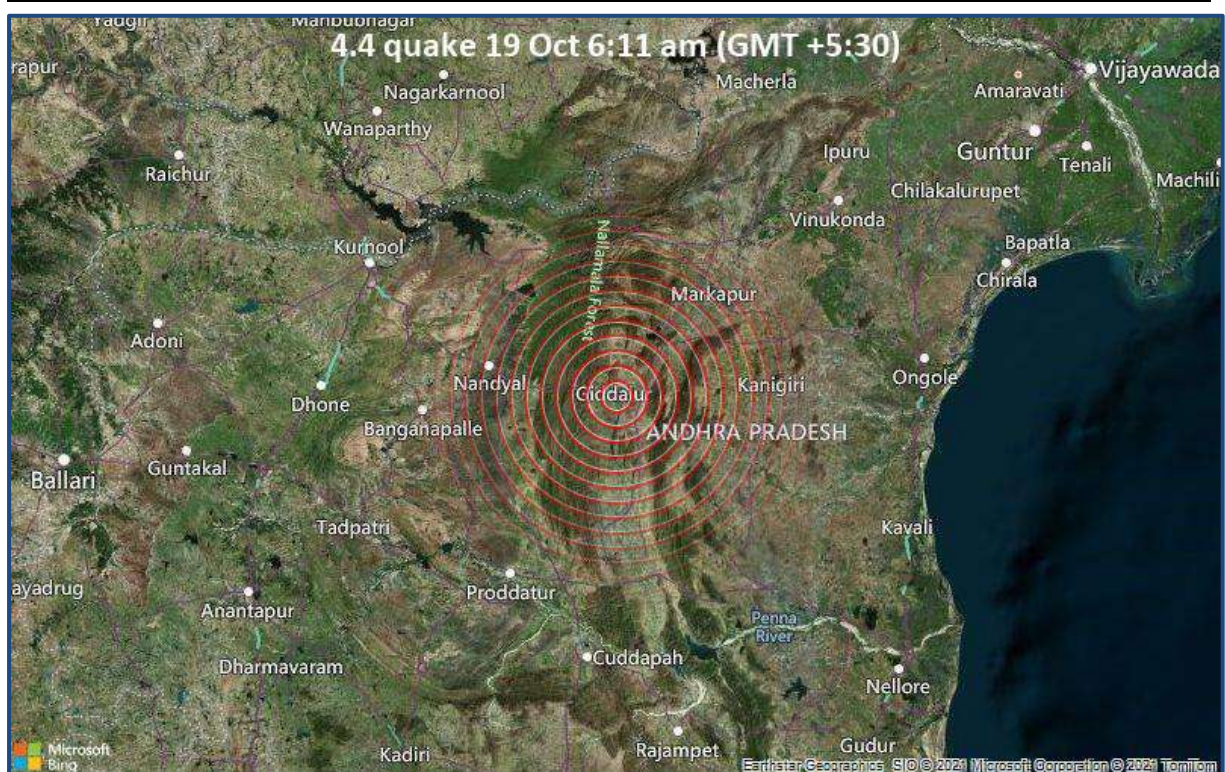
Most of the residents kept sleeping through the tremors. “We are not aware of it,” said an Imphal West district resident. Residents of other districts such as Senapati, Tamenglong, and Ukhrul.

An earthquake with a magnitude of 4.9 on the Richter scale struck the state on July 26 this year. Its epicentre was close to Ukhrul district too.

On January 4, 2016, Manipur witnessed a strong earthquake measuring 6.7 on the Richter scale with its epicentre in Tamenglong. It claimed eight lives and damaged many houses and structures including the iconic ‘Nupi Keithel’ (Women’s market) in Imphal.

#### **7.4 Moderate mag. 4.4 earthquake - 0.7 km southeast of Giddalūr, Prakasam, Andhra Pradesh, India, on Tuesday, Oct 19, 2021 6:11 am (GMT +5:30) - 10 weeks ago**

**Source:** volcanodiscovery.com, 19 October, 2021



#### **4.4 quake 19 Oct 6:11 am (GMT +5:30)**

A magnitude 4.4 earthquake near Giddalūr, Prakasam district, Andhra Pradesh, India, was reported only 13 minutes ago by India's National Center for Seismology (NCS), considered the main national agency that monitors seismic activity in this part of the world. The earthquake occurred at a shallow depth of 10 km beneath the epicenter early morning on Tuesday,

October 19th, 2021, at 5:41 am local time. The exact magnitude, epicenter, and depth of the quake might be revised within the next few hours or minutes as seismologists review data and refine their calculations, or as other agencies issue their report.

Based on the preliminary seismic data, the quake was probably felt by many people in the area of the epicenter. It should not have caused significant damage, other than objects falling from shelves, broken windows, etc.

In Giddalūr (pop. 28,100) located 1 km from the epicenter, and Diguvametta (pop. 5,200) 11 km away, the quake should have been felt as light shaking.

Weak shaking might have been felt in Cumbum (pop. 22,700) located 31 km from the epicenter, Nandyāl (pop. 165,300) 49 km away, and Mārkāpur (pop. 64,000) 55 km away.

Other towns or cities near the epicenter where the quake might have been felt as very weak shaking include Atmakūr (pop. 35,100) located 68 km from the epicenter, Proddatūr (pop. 177,800) 80 km away, and Kadapa (pop. 127,000) 100 km away.

VolcanoDiscovery will automatically update magnitude and depth if these change and follow up if other significant news about the quake become available. If you're in the area, please send us your experience through our reporting mechanism, either online or via our mobile app. This will help us provide more first-hand updates to anyone around the globe who wants to know more about this quake.

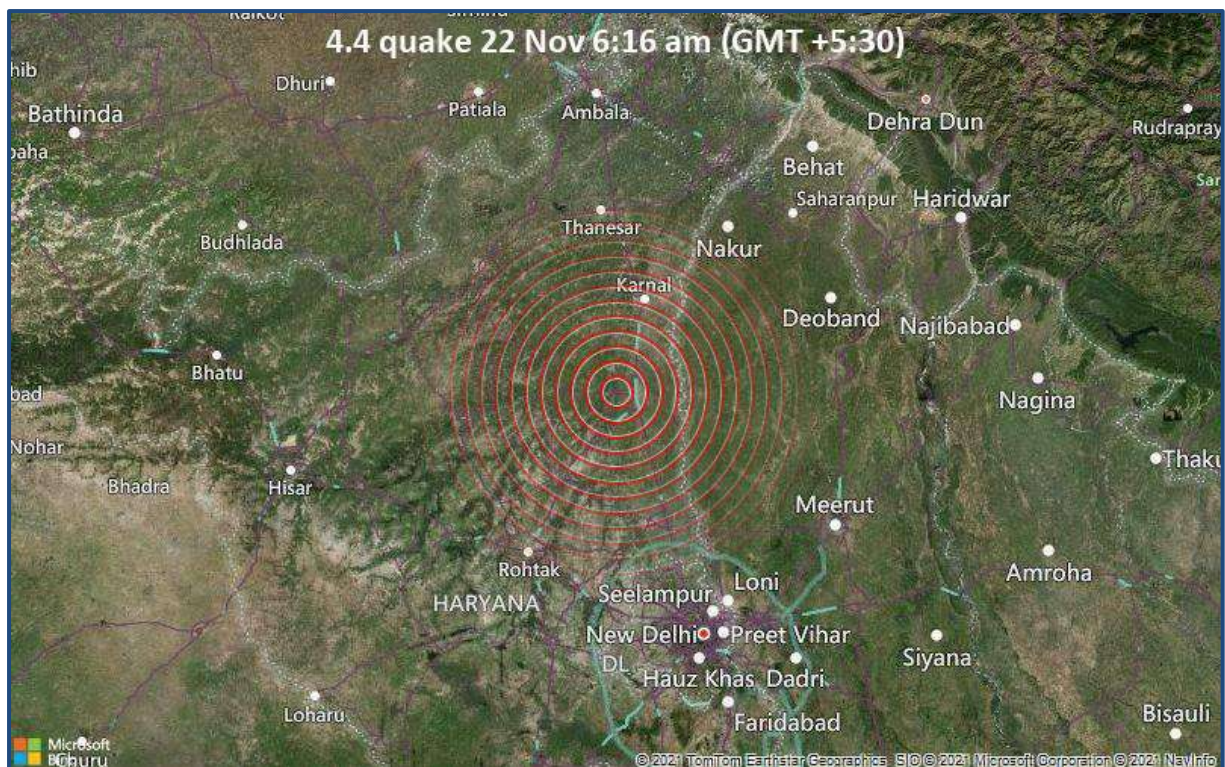
### **7.5 Moderate mag. 4.4 earthquake - 6.9 km west of Panipat, Haryana, India, on Monday, Nov 22, 2021 6:16 am (GMT +5:30) - 5 weeks ago**

**Source:** [volcanodiscovery.com](https://volcanodiscovery.com), 22 November, 2021

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A magnitude 4.4 earthquake near Panipat, Haryana, India, was reported only 16 minutes ago by India's National Center for Seismology (NCS), considered the main national agency that monitors seismic activity in this part of the world. The earthquake occurred at a shallow depth of 10 km beneath the epicenter early morning on Monday, November 22nd, 2021, at 5:46 am local time. The exact magnitude, epicenter, and depth of the quake might be revised within the next few hours or minutes as seismologists review data and refine their calculations, or as other agencies issue their report.





#### **4.4 quake 22 Nov 6:16 am (GMT +5:30)**

Based on the preliminary seismic data, the quake was probably felt by many people in the area of the epicenter. It should not have caused significant damage, other than objects falling from shelves, broken windows, etc.

In Panipat (pop. 292,800) located 7 km from the epicenter, the quake should have been felt as light shaking.

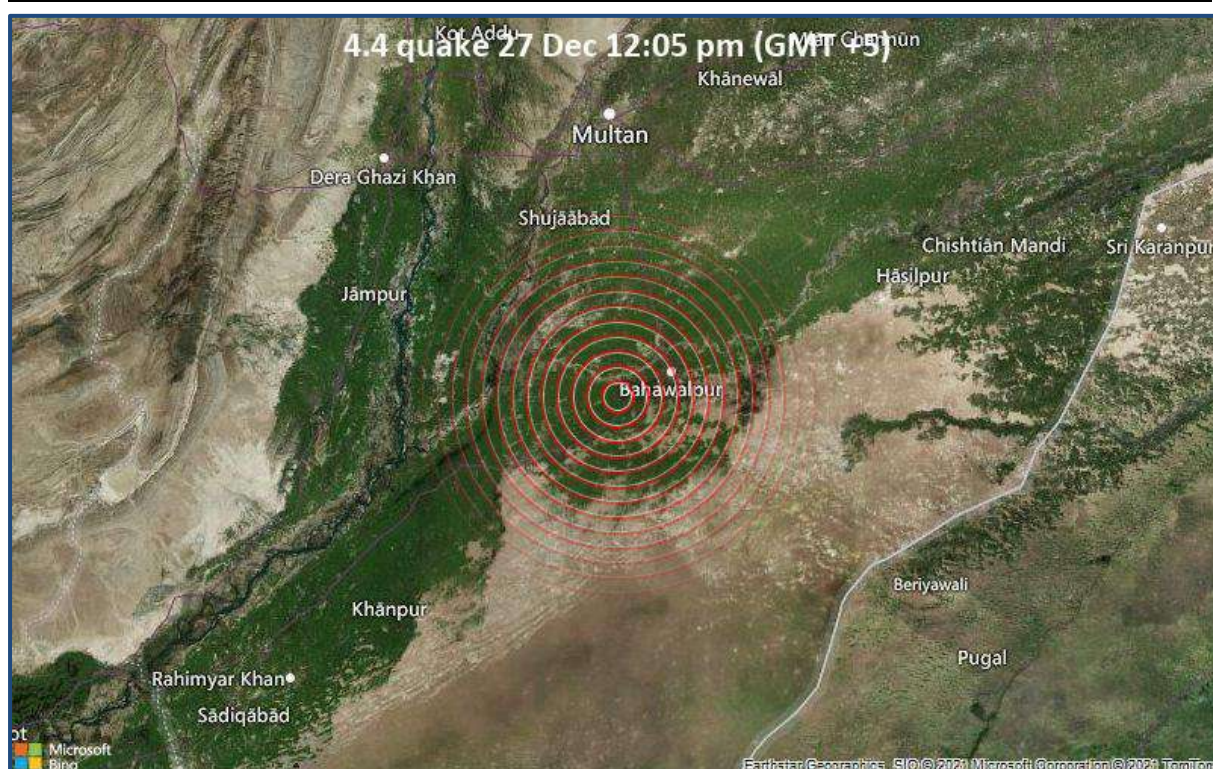
Weak shaking might have been felt in Gharaunda (pop. 34,300) located 17 km from the epicenter, Samalkha (pop. 35,600) 21 km away, Safidon (pop. 30,900) 22 km away, Karnāl (pop. 225,000) 33 km away, Gohana (pop. 56,100) 35 km away, and Sonipat (pop. 250,500) 47 km away.

Other towns or cities near the epicenter where the quake might have been felt as very weak shaking include Narela (pop. 800,000) located 64 km from the epicenter, Saharanpur (pop. 484,900) 89 km away, and New Delhi (pop. 317,800) 91 km away.

VolcanoDiscovery will automatically update magnitude and depth if these change and follow up if other significant news about the quake become available. If you're in the area, please send us your experience through our reporting mechanism, either online or via our mobile app. This will help us provide more first-hand updates to anyone around the globe who wants to know more about this quake.

## **7.6 Moderate mag. 4.4 earthquake - 21 km southwest of Bahawalpur, Bahāwalpur, Punjab, Pakistan, on Monday, Dec 27, 2021 12:05 pm (GMT +5) - 23 hours ago**

**Source:** volcanodiscovery.com,28 December,2021



### **4.4 quake 27 Dec 12:05 pm (GMT +5)**

An earthquake of magnitude 4.4 occurred only 10 minutes ago 21 km southwest of Bahawalpur, Pakistan, India's National Center for Seismology (NCS) reported.

The quake hit at a shallow depth of 10 km beneath the epicenter near Bahawalpur, Bahāwalpur District, Punjab, Pakistan, around noon on Monday, December 27th, 2021, at 12:05 pm local time. The exact magnitude, epicenter, and depth of the quake might be revised within the next few hours or minutes as seismologists review data and refine their calculations, or as other agencies issue their report.

Based on the preliminary seismic data, the quake should not have caused any significant damage, but was probably felt by many people as light vibration in the area of the epicenter.

Weak shaking might have been felt in Bahawalpur (pop. 552,600) located 21 km from the epicenter, Lodhran (pop. 97,200) 28 km away, Ahmadpur East



(pop. 116,600) 29 km away, Yazman (pop. 24,600) 34 km away, Dhanote (pop. 18,700) 39 km away, and Kahrer Pakka (pop. 69,700) 54 km away.

Other towns or cities near the epicenter where the quake might have been felt as very weak shaking include Shujaabad (pop. 66,000) located 65 km from the epicenter, and Multan (pop. 1,437,200) 98 km away.

VolcanoDiscovery will automatically update magnitude and depth if these change and follow up if other significant news about the quake become available. If you're in the area, please send us your experience through our reporting mechanism, either online or via our mobile app. This will help us provide more first-hand updates to anyone around the globe who wants to know more about this quake.



## **Extreme Weather Events – Global**

### **8. Heat Wave**

#### **8.1 Severe heatwave and high bushfire danger forecast ahead of Australia Day**

**Source:** theguardian.com, 20 January, 2021

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Weather forecast to ease by Australia Day after ‘big burst of summer heat’

A burst of heat is set to sear much of Australia ahead of the Australia Day long weekend, sending temperatures soaring and sparking bushfire concerns.



#### **Australia’s weather bureau has forecast a heatwave and high bushfire danger in the lead-up to Australia Day**

The Bureau of Meteorology is forecasting a severe heatwave to settle across much of the south-east of the country, with temperatures set to be up to 15C above average.

“A big burst of summer heat is on the way,” bureau meteorologist Dean Narramore said on Wednesday. “We’re expecting severe to extreme heatwave conditions through large parts of the country, extending from southern

Western Australia all the way to the New South Wales coast, particularly near and south of Sydney.”

Narramore said the hot conditions would begin in WA on Wednesday and Thursday before extending across to Victoria and NSW from Friday to Sunday.

“Sunday is looking like the hottest day in south-eastern Australia,” he said. “We could see widespread 40s and even mid-40s expected through northern parts of Victoria, western and southern parts of NSW and much of inland South Australia.”

Sydney is forecast to face temperatures between 30C and 33C across the weekend, with the hottest day expected to be Monday, at 34C, while Melbourne’s hottest day is forecast to be 38C on Sunday.

Narramore said the bureau was expecting conditions to ease by Australia Day with many capital cities likely to see a sudden drop in temperatures by then. SA and southern Victoria can expect the cool change on Monday before it moves into NSW on Tuesday.

“Some places will be in the 40s on Sunday but probably only into the 20s or possibly even the teens on Tuesday. So ... it’ll be very hot and then quite cool after that.”

The heat comes after a wet and cool start to summer largely driven by the La Niña event that has shaped Australia’s weather since September. But shifting weather patterns across the country’s north has brought a reprieve from the somewhat dreary 2020-21 summer.

“We’re starting to see more of a summer pattern,” Narramore said on Wednesday. “When it’s really wet and active across the north, as we’re seeing now, then we’ll likely see high pressure and heat and dry conditions across the south.”

A front moving across the southern parts of the country, in addition to an easterly that has blown for weeks across eastern and southern Australia, is going to drag the heat that has settled on much of Western Australia across to the east coast. With that heat comes the potential for bushfires, with the bureau expecting fire dangers to spike across the weekend.

“We’re going to see very high to severe fire dangers across many parts of WA and also southern SA,” Narramore said.

“On Friday and Saturday, we’re likely to see very high fire dangers spread across many inland paths of south-eastern Victoria, SA and also NSW. On Sunday and Monday, we could also see severe fire dangers for parts of south-eastern Australia.”

Narramore also warned beachgoers to keep an eye on weather updates and surf warnings.

“Be careful as you’re heading out to the beach as, even in fine and sunny conditions, you’d still get riptides,” he said. “It’s not looking too bad for beach weather, it’s actually looking pretty nice, and I’m sure many will head down there, but, as always, just be weather aware.”

Meanwhile, residents along the Pilbara coast in Western Australia are preparing for the first cyclone of the season, after authorities warned a tropical low could develop into a cyclone by Thursday.

Authorities have advised residents to prepare for heavy rain and destructive winds, with the Bureau of Meteorology warning of a severe impact along the coast between Bidyadanga and Dampier.

The Department of Fire and Emergency Services assistant commissioner, Paul Ryan, said residents needed to begin preparing now, have a survival kit, and check their properties for loose items.

“It will take a couple of days, but we need to start planning and moving now,” he told reporters. “We’re asking people not to go out on a red alert, and saying to people, do not ever walk or drive through floodwater.”

## **8.2 Heat wave across southeast Australia stokes bushfires near Adelaide**

**Source:** [timesofindia.indiatimes.com](https://timesofindia.indiatimes.com), 25 January, 2021



MELBOURNE:  
Searing heat  
scorched  
southeastern  
Australia on  
Monday, stoking  
bushfires near the  
city of Adelaide and  
driving crowds to  
the beaches on an  
extended long  
weekend in what  
has mostly been a  
wetter than normal  
summer.

Six firefighting aircraft and crews on the ground battled blazes in the Adelaide Hills, where two homes in were damaged or destroyed, state officials said, adding that investigations were underway into the cause.

"There is still work to be done to get this under control," Australian Prime Minister Scott Morrison told reporters.

The fire risk was downgraded on Monday, with residents urged to "watch and act". "It was good that we didn't get the wind that was actually forecast," South Australia Country Fire Service deputy controller Yvette Dowling told reporters.

A cool change, with rain, was expected to ease fire conditions on Monday afternoon, she said.

Temperatures soared above 40 degrees C (104°F) across the southeast, but dropped sharply as a cool change moved in earlier than expected in Victoria, where temperatures dropped about 10 degrees in 10 minutes, the Bureau of Meteorology said.

The blazing heat is expected to continue for another day in Australia's biggest city, Sydney, in the state of New South Wales, before temperatures fall back to the mid-20 degrees C.

The overall fire threat in Australia has otherwise been muted this season in stark contrast to last year, dubbed the "Black Summer", when bushfires killed 33 people and billions of native animals and razed more than 24 million hectares (59 million acres).

### **8.3 London weather: Mini February 'heat wave' on its way as temperatures set to rocket**

**Source:** mylondon.news,14 February,2021

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With temperatures plummeting to -5C in some parts of London in the last few days, everyone was hoping that good news would take the form of an improvement in the weather.

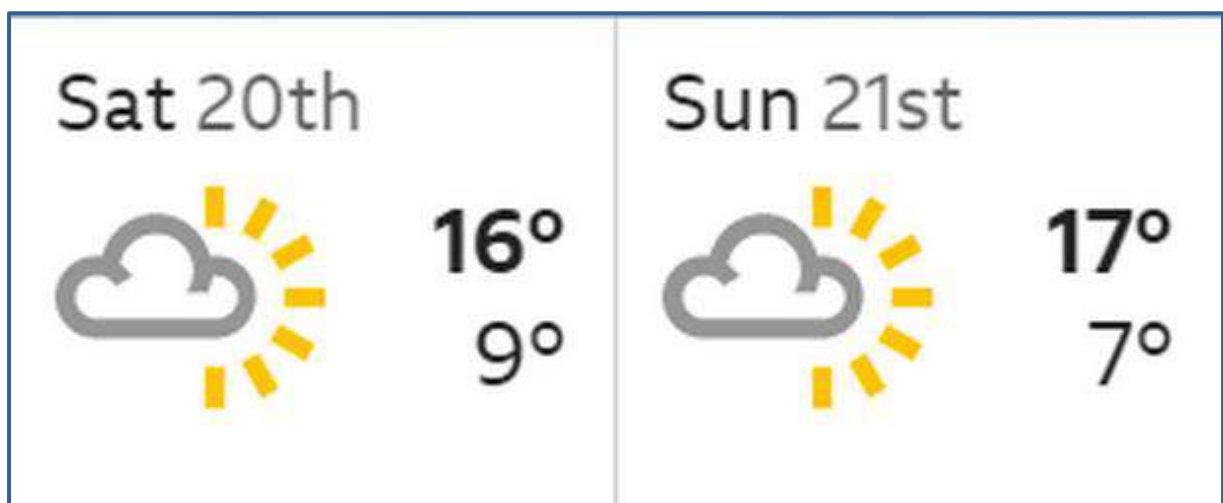
And it looks like prayers will be answered as London is set to see a dramatic increase in temperature. We have seen some of the coldest temperatures on record in London in February, and now we might be on course to see some of the highest.

Last week there were frozen scenes across the capital with parts of the Thames and Trafalgar Square fountains freezing up. Usually at this time of year, London has an average temperature of between 2C and 8C.



**The thermometer could be hitting the heights of 17C in February**

But according to BBC Weather, next weekend we will see temperatures rising to 17C, with sunny spells as well.



**There will a dramatic increase in temperature next weekend**

This means London will have seen a 21C increase in temperature in the space of a week.

But before then it will be a wet windy start to the week, with a jump of 8C by tomorrow (Monday, February 15).



Chief meteorologist at the Met Office, Neil Armstrong, said: “For the past week the UK has been in a very cold airmass with temperatures well below average, this will change through the weekend as milder air moves in from the Atlantic and pushes that cold airmass out into the North Sea.

“Where temperatures were close to freezing in many places last week, we could expect to see 11C or 12C next week.”

## **8.4 Texas Storms, California Heat Waves and ‘Vulnerable’ Utilities**

**Source:** nytimes.com, 18 February, 2021

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Power failures have cast a spotlight on whether energy companies and regulators are doing enough to prepare for climate change and natural disasters.

In California, wildfires and heat waves in recent years forced utilities to shut off power to millions of homes and businesses. Now, Texas is learning that deadly winter storms and intense cold can do the same.

The country’s two largest states have taken very different approaches to managing their energy needs — Texas deregulated aggressively, letting the free market flourish, while California embraced environmental regulations. Yet the two states are confronting the same ominous reality: They may be woefully unprepared for the increasing frequency and severity of natural disasters caused by climate change.

Blackouts in Texas and California have revealed that power plants can be strained and knocked offline by the kind of extreme cold and hot weather that climate scientists have said will become more common as greenhouse gases build up in the atmosphere.

The problems in Texas and California highlight the challenge the Biden administration will face in modernizing the electricity system to run entirely on wind turbines, solar panels, batteries and other zero-emission technologies by 2035 — a goal that President Biden set during the 2020 campaign.

The federal government and energy businesses may have to spend trillions of dollars to harden electricity grids against the threat posed by climate change and to move away from the fossil fuels responsible for the warming of the planet in the first place. These are not new ideas. Scholars have long warned that American electricity grids, which are run regionally, will come under increasing strain and needed major upgrades.

“We really need to change our paradigm, particularly utilities, because they are becoming much more vulnerable to disaster,” Najmedin Meshkati, an engineering professor at the University of Southern California, said about blackouts in Texas and California. “They need to always think about literally the worst-case scenario because the worst case scenario is going to happen.”

Mr. Meshkati, who served on National Academies committees that studied BP’s Deepwater Horizon oil spill and the Fukushima nuclear disaster, said Mr. Biden should establish a commission to investigate the grid failures in Texas and California and recommend changes.

But it is not clear how much Mr. Biden will be able to accomplish, given the limited federal role in overseeing utilities, which are primarily regulated at the state level. He may not even be able to assemble a majority in Congress to advance an ambitious climate plan given the Democrats’ narrow hold on the Senate and strong opposition from most Republicans to policies designed to reduce greenhouse gas emissions.

In California and Texas, conservatives have blamed renewable energy for blackouts even though energy experts, grid managers and utility executives have said outages at solar and wind farms played a smaller role than poor planning and problems with the natural gas supply and other power sources.

That Texas and California have been hardest hit makes clear that simplistic ideological explanations are often wrong. Texas, for example, has relied on market forces to balance its electric grid. If there is not enough supply, the price for electricity in its wholesale market shoots up, which is meant to encourage companies to produce more power and businesses and consumers to use less. California also has a power market, but it requires power producers to maintain excess capacity that can be called upon in emergencies. Yet both systems buckled in extreme conditions.

The common theme in the two states is that many traditional power plants are much more sensitive to temperature changes than the utility industry has acknowledged, said Jay Apt, co-director of the Carnegie Mellon Electricity Industry Center.

“Coal plants and gas plants have problems in both heat and cold,” said Mr. Apt, who is also a professor at Carnegie Mellon University.

Last August, several power plants fired by natural gas stopped generating electricity as Californians were cranking up air-conditioners because equipment at the plants malfunctioned in the hot weather. Other plants

were down for maintenance, which many experts found odd given that electricity demand typically peaks in the late summer.

Short of power just as demand was peaking, the California Independent System Operator, which manages the state's grid, ordered utilities to conduct rolling blackouts until the system achieved balance. The order came so abruptly that Gov. Gavin Newsom complained that the blackouts "occurred without prior warning or enough time for preparation."

Separately, California utilities have also shut off power to hundreds of thousands of customers in the last couple of years to prevent power lines and other equipment from starting fires during dry, windy days.

In Texas this week, many natural gas plants went offline or had to scale back operations because their equipment froze. Others could not generate as much power as they normally do because the pipelines that deliver gas to them were frozen or were not receiving enough gas from fields in the Permian Basin of West Texas and New Mexico, where operations were also hampered by below-freezing temperatures.

The electricity industry typically looks at average annual temperatures rather than seasonal ones. Changing the distribution of power sources based on the seasonal temperatures could help avoid electricity shortages. For example, nuclear plants generally function well in the cold but become vulnerable to heat because of the need for cooling water, Mr. Apt said.

Extreme temperatures should not have caught utilities and grid managers by surprise. Historical weather data has shown a clear increase in very hot summer days over the last few decades.

In addition, Mr. Apt pointed out that the United States had experienced five major cold snaps since 2011, including the polar vortex in 2014 that led to the shutdown of almost a quarter of available electricity in the nation's largest energy market, PJM, which serves the Mid-Atlantic region. At some plants, coal mounds became unusable because they froze.

"These kinds of cold snaps are not particularly rare," Mr. Apt said. "A Black Swan event — an unknown unknown — it wasn't."

Some climate scientists think that a warming Arctic may be responsible for harsher winter storms even as winters are becoming milder over all.

The Edison Electric Institute, which represents investor-owned utilities, acknowledged that the industry faced numerous challenges, but pointed out that much of its work is closely overseen by state and federal officials.

“It’s important to reinforce that we are the most heavily regulated industry in the country, and how we serve customers is determined by the different rules and regulations set by federal and state regulators,” said Brian Reil, a spokesman for the group.

Pedro J. Pizarro, president and chief executive of Edison International, the parent company of California’s second-largest investor-owned utility, said no utility in Texas or California had anticipated the kinds of extreme weather that hit the two states.

“Let me start here and acknowledge that both the Texas event and the California event are really good examples that we are all living with climate change,” Mr. Pizarro said. “Electric grid systems need to be able to deal with the new normal.”

Mr. Pizarro said his company was adding to battery storage, which can help when demand spikes in extreme weather. California has also required its utilities to install more batteries, which generally deliver electricity more quickly than large power plants, though they do so for only a few hours at a time. Lawmakers, residents and others have begun demanding a clear accounting of what went wrong this week, as they did in California last summer, and how another dayslong power crisis can be avoided.

Some of them have criticized the Electric Reliability Council of Texas, which manages the state’s grid, for not doing more to require plants to prepare for freezing temperatures. To prevent more such failures, the council could learn from states in colder climates where power plants and other equipment is winterized with insulation and heaters.

Some potential fixes would be useful in Texas and California. Neither state appears to have enough capacity to make up for the gap between supply and demand during extreme weather. They may need to invest more in batteries and transmission lines to bring in power from other states. Texas has historically chosen not to have extensive links to other states, to avoid federal regulation.

States could also require some natural gas plants to be ready to ramp up quickly in an emergency with enough gas stored on site to run for several days to avoid relying on pipelines. That reliance can be deadly, as Texas learned this week. Some changes are already being made. In California, regulators had allowed some natural gas plants to shut down even though it was clear that the gap between supply and demand was narrow on the hottest summer days and in the late afternoon as the sun goes down and solar panels stop producing electricity. After the August blackouts, the

California Public Utilities Commission delayed the closing of several natural gas power plants.

Dan Reicher, a founding director of the Steyer-Taylor Center for Energy Policy and Finance at Stanford University, said utilities, grid managers and regulators needed to become much better at planning for storms, heat waves and cold weather. “If we cannot get our act together with the U.S. grid, we’re not going to solve the climate crisis.”

### **8.5 Queensland to endure 38-degree scorcher on Monday as heatwave descends on state**

**Source:** [brisbanetimes.com.au](https://www.brisbanetimes.com.au/21-February-2021), 21 February, 2021

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Queensland’s heatwave will peak on Monday, with the mercury expected to go as high as 12 degrees above average for parts of the state.

Bureau of Meteorology forecaster Jonathan How said parts of Queensland were expected to endure the hottest day this summer.



**Parts of Queensland are expected to suffer through the hottest day in more than a year.**

“Hot days and warm nights are on their way for parts of Queensland, with heatwave conditions building across eastern parts of the state,” he said.

“We will see temperatures of about six – up to 12 – degrees above average temperatures for this time of year over the next few days, with Monday looking to be the peak heat day.



“That is when we will see temperatures get up into the high 30s – even the low 40s as well – for parts of the south-east and central districts.”

Mr How said the Capricornia district, which takes in Rockhampton, would bear the brunt of the scorching conditions.

“But we will see above-average temperatures stretch down towards Brisbane and inland as well as far west as places like Longreach and Birdsville,” he said.

“On Monday, through western parts of Brisbane and along the coast to places like Gladstone and Bundaberg, we will see temperatures of 36 to 38 degrees.” Brisbane was expected to reach 34 degrees on Monday, while Ipswich was bracing for a top of 37 and Gatton 38.

The Gold and Sunshine coasts were expected to peak at 32 degrees on Monday.

“It is summer so it is not unusual for this time of year, but it will be uncomfortable as well, and some places could see their hottest days since December 2019,” Mr How said, adding that showers and storms would start to develop off the coast on Tuesday.

“It is not until Wednesday that we will see a little bit more relief from the heat, with more widespread thunderstorm activity, but it will still be quite hot until the weekend.”

## **8.6 Beijing records highest winter temperature ever amid heat wave**

**Source:** news.yahoo.com,25 February,2021

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A sleepy giant panda at Beijing Zoo in Beijing, China, on Feb. 2021 -- the day after the capital city saw the high temperature record for winter shattered by 10 degrees. (Reuters)

Temperatures have been on a roller coaster across China this winter, allowing the nation's capital city to achieve the unique distinction of setting temperature records at both extremes during the same winter. Beijing in recent days set a new all-time high-temperature record for the winter months just weeks after experiencing record-setting cold.

Temperatures have fluctuated all over the place in Beijing during the month of February, but a major heat wave began late last week and sent mercury readings skyrocketing well beyond what has been previously seen there at this time of year.



A stagnant area of high pressure over central Asia allowed heat to continue to build throughout the weekend and temperatures to spike well above normal.

"The high temperature in Beijing reached 68 F (20 C) on Saturday, Feb. 20, before temperatures spiked into the 70s F (20s C) on Sunday," said AccuWeather Senior Meteorologist Tyler Roys, who focuses on international weather.

The warmest air in more than two decades allowed temperatures in eastern China to begin creeping above normal on the afternoon of Thursday, Feb. 18, with a high temperature of 46 F (about 7.5 C) in Beijing. Comparatively, the average high in Beijing in late February is about 41 F (5 C).

A stagnant area of high pressure over central Asia allowed heat to continue to build throughout the weekend and temperatures to spike well above normal.

"The high temperature in Beijing reached 68 F (20 C) on Saturday, Feb. 20, before temperatures spiked into the 70s F (20s C) on Sunday," said AccuWeather Senior Meteorologist Tyler Roys, who focuses on international weather.

In fact, the temperature topped out at exactly 78 F (25.6 C) on Sunday, Feb. 21, and became the highest temperature ever recorded in Beijing during the winter months.

The 78-degree reading completely obliterated the previous record which was a temperature of 67.6 F (19.8 C) set back in 1996, according to CNN. A Reuters photo taken at the Beijing Zoo the day after the record was broken showed an exhausted-looking panda looking very much as though it had just endured a record-setting heat wave.

"Temperatures in the upper 70s are more typical of a late-spring day in mid-May, rather than in the second half of February," said Roys.

Beijing wasn't the only city in eastern Asia to experience abnormal warmth.

The city of Pohang, South Korea, set a new daily record temperature on Sunday when the city reached 76.8 F (24.9 C). Pohang's normal late-February high temperature is around 46 F (8 C).

The heat continued into Monday allowing more of eastern Asia to hit new records including Shanghai, which topped out at 78 F (25.6 C), and Tokyo, which hit a high of 71.4 F (21.9 C).

Temperatures have since moderated, returning much closer to normal for most locations. Near-normal temperatures are forecast for the rest of February across much of the eastern part of the continent.

People wearing face masks to help curb the spread of the coronavirus head to work as the capital city is hit by cold wind in Beijing, Wednesday, Jan. 6, 2021.

The weather in China during the 2020-21 winter season has been particularly extreme. Just a few weeks ago, Arctic air swept across the country, bringing Beijing's temperatures down to levels not seen in half a century.

On the morning of Thursday, Jan. 7, thermometer readings plunged to 3.3 F below zero (-19.6 C) in Beijing, breaking the daily cold-weather record set in 1969.

Beijing was also quite cold in the middle of December, when temperatures dropped to 13 F (11 C below zero), helping to create sea-effect snow as the bitterly cold air flowed across the Sea of Japan. More sea-effect snow hit Japan later in January, causing a deadly highway pileup.

While record-high winter temperatures hit eastern Asia last weekend, much of the United States was in the grips of a deep freeze, with cold-temperature records falling in multiple states. Within just a week's time, though, temperatures rebounded in astonishing fashion.

## 8.7 Heat wave to douse HCMC in hazardous UV

**Source:** e.vnexpress.net, 2 March, 2021

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**Men shield themselves with umbrellas to hide from the scorching sun as they wait to send necessary supplies to family members at a Covid-19 quarantine camp in HCMC, March 2020.**

Temperature in the southern metropolis will rise to more than 35 degrees Celsius (95 degrees Fahrenheit) in the coming days, with UV levels expected to remain at a hazardous 10.

Southern parts of Vietnam including Ho Chi Minh City are now experiencing dry season.

"In the coming days, southern cities and provinces will suffer strong heat and scorching sunlight, with the highest temperature to surpass 35 degree Celcius," said Le Dinh Quyet, deputy head of the forecasting office under the Hydro-meteorological Observatory for the Southern Region.

As predicted by the center, in the next 10 days, the average temperature in the city will remain around 24-35 degrees Celsius. In this period, skies would be less cloudy than normal or have no clouds at all.

In the three days of March 1-3, the city's UV Index would reach the "very high" levels of 10-11.



The UV Index is an international standard measurement of the strength of ultraviolet radiation from the sun. Between 0 and 3 is considered low and above 11 is deemed extreme with radiation that could burn skin and damage eyes within 20-30 minutes. American forecast services provider AccuWeather has made similar forecast, adding city air pollution reached unhealthy levels Monday and will remain unchanged for the next two days.

During the last dry season, HCMC and southern Vietnam suffered different heat waves lasting from March to June, with HCMC spending days beneath the scorching sun as temperature rose to 37-38 degrees Celsius.

## **8.8 Yellow level heat wave in seven areas in Peninsula**

**Source:** nst.com.my, 6 March, 2021



**Muhammad Shuharimin Farouk takes his horse for a stroll in Kuala Terengganu, despite the hot weather.**

KUALA LUMPUR: Seven areas in Peninsular Malaysia recorded yellow (alert) level heat wave as at 4.30pm yesterday, according to the Malaysian Meteorological Department (MetMalaysia).

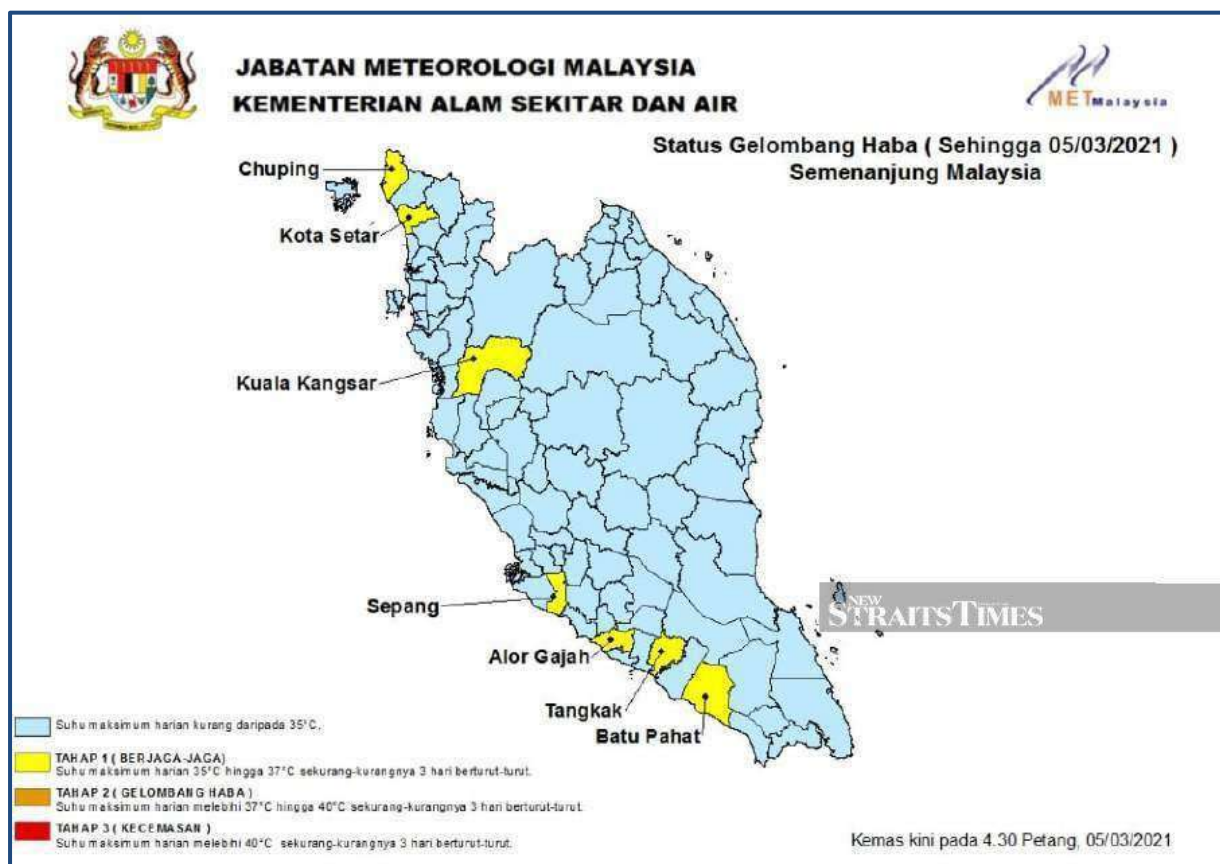
The department's portal showed the locations were Chuping, Perlis; Kota Star, Kedah; Kuala Kangsar, Perak; Sepang, Selangor; Alor Gajah, Melaka and Tangkak and Batu Pahat di Johor.



However, no areas in Sabah or Sarawak recorded a heat wave situation. The maximum daily temperature recorded in the two states was less than 35 degrees.

Yellow level refers to a daily maximum temperature of 35 to 37 degrees Celsius for at least three consecutive days.

Orange level is when the daily maximum temperature is 38 to 40 degrees Celsius while red denotes a hazardous situation whereby the maximum temperature is above 40 degrees Celsius, each for a period of at least three consecutive days.



Meanwhile, as of noon today, the Air Pollutants Index (API) reading in most areas in the peninsula showed moderate air quality with Rompin district in Pahang recording the highest reading of 92, while Sabah and Sarawak had good APIs.

API readings between 0 to 50 denote good air quality, 51 to 100 (moderate), 101 to 200 (unhealthy), 201 to 300 (very unhealthy) while 300 and above (hazardous).

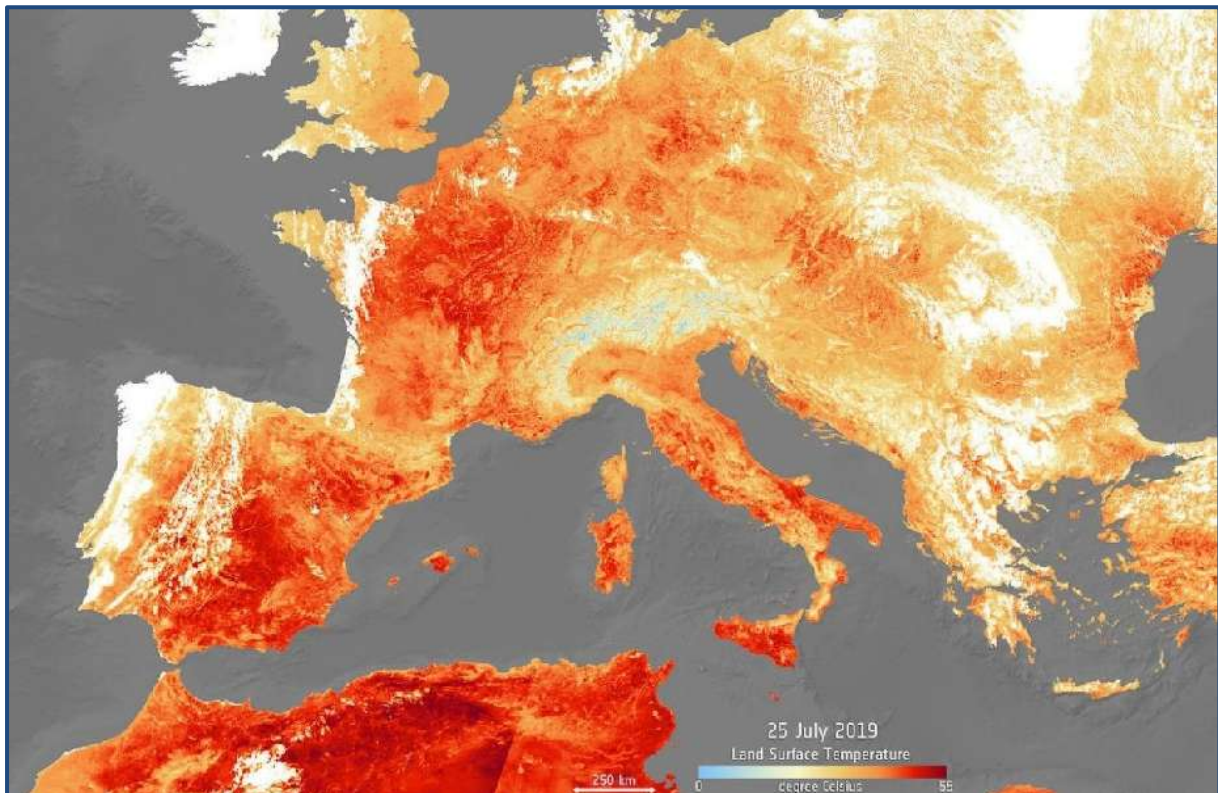
MetMalaysia previously informed that the country is now in the final phase of the Northeast Monsoon season which is expected to continue until the

middle of this month, with relatively low rainfall in the peninsula, especially in the northern states.

However, the department does not expect unusually hot weather conditions to occur this year. – Bernama

### **8.9 Europe's recent heat waves are the worst in 2,000 years: study**

**Source:** nationalobserver.com, 16 March, 2021



**A heat map shows Europe on July 26, 2019, in the midst of an extreme heat wave that saw temperatures reach as high as 41 C in Paris, France. Image contains modified Copernicus Sentinel data (2019), processed by ESA / Flickr (CC BY-SA 3.0)**

The series of severe droughts and heat waves in Europe since 2014 is the most extreme for more than 2,000 years, research suggests.

The study analyzed tree rings dating as far back as the Roman empire to create the longest such record to date. The scientists said global heating was the most probable cause of the recent rise in extreme heat.

The heat waves have had devastating consequences, the researchers said, causing thousands of early deaths, destroying crops and igniting forest fires. Low river levels halted some shipping traffic and affected the cooling of

nuclear power stations. Climate scientists predict more extreme and more frequent heat waves and droughts in future.

The study also found a gradual drying of the summer climate in central Europe over the last two millennia, before the recent surge. The scientists ruled out volcanic activity and solar cycles as causes of this long-term trend and think subtle changes in Earth's orbit are the cause.

"We're all aware of the cluster of exceptionally hot and dry summers we've had over the past few years," said Prof. Ulf Büntgen, of Cambridge University, who led the study. "Our results show what we have experienced is extraordinary. The series is unprecedented for the last 2,000 years." The available data ends in 2018, but 2019 and 2020 also had very hot European summers.

The scientists said changes in the position of the jet stream and the circulation of air over the continent caused the droughts, and that climate change was probably the underlying driver. "Climate change (means) extreme conditions will become more frequent, which could be devastating for agriculture, ecosystems and societies as a whole," said Büntgen.

Prof. Miroslav Trnka, of the CzechGlobe research centre in Brno, who was part of the study team, said the sharp increase in droughts was particularly alarming for agriculture and forestry. "Unprecedented forest dieback across much of central Europe corroborates our results," he said.

Dr. Friederike Otto, of Oxford University, said a lack of historic data often hindered the clear identification of the drivers of observed events, making the new work important and useful. "It corroborates from a long-term perspective that the huge increase in heat extremes observed over Europe in the summer, which has clearly been attributed to human-induced climate change, does indeed change the nature of summer in Europe," she said.

The study, which was published in the journal *Nature Geoscience*, analyzed 27,000 growth rings from 147 oak trees. Living oaks were used for the last century, then timber from old buildings such as churches. For the Middle Ages, the researchers used oak that had been preserved in river deposits or gravel beds, and for the Roman period they used remains such as wood used to construct wells.

Previous climate reconstructions from tree rings used width and wood density to determine temperature. The Büntgen-led study used measurements of carbon and oxygen isotopes to show how much water was available to the trees, giving a record of droughts. This showed that the high frequency of recent European droughts was unprecedented, even compared

with severe historical droughts such as the Renaissance drought in the early 16th century. The wood samples come from the Czech Republic and Bavaria in Germany, and represent climate conditions across central Europe. High temperatures were the main cause of recent droughts, and these have been seen across Europe.

The climate crisis is also linked to extreme wet weather in winter. The rainfall in the U.K. on Oct. 3, 2020 was the highest in records dating back to 1891, and a study published last Wednesday said this had been made three times more likely by global heating. The research by the U.K. Met Office also found that such downpours will be 10 times more likely by 2100 without major cuts to carbon emissions.

### **8.10 Heat wave to hit Egypt on Saturday**

**Source:** [egyptindependent.com](https://egyptindependent.com), 17 March, 2021

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Beginning Saturday and lasting through Monday, temperatures are expected to rise in most parts of the country between six and eight degrees, with extremely hot weather in Upper Egypt during the day, and cold temperatures at night.

In a statement, the Egyptian Meteorological Authority added that Thursday and Friday should witness light mist in the morning along some agricultural land and



highways close to bodies of water in Cairo, the Nile Delta region, the Suez Canal cities, the north coast, and north and central Sinai.

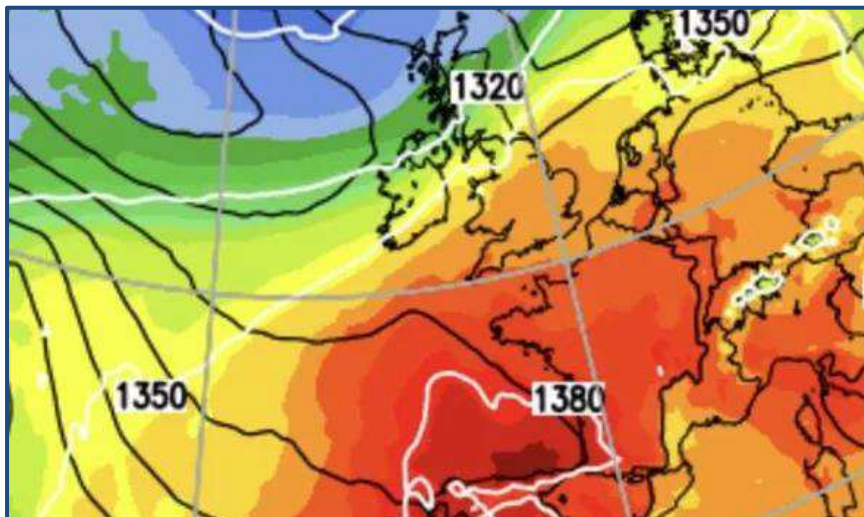
Wind is expected to be active over some areas of South Sinai.

On Saturday, the wind is expected to be active over Egypt's northwest coast, spreading along the entire coast by Monday.

Sunday is predicted to bring sandstorms to Cairo, the Delta, Suez, the north coast, and northern Upper Egypt.

### **8.11 UK to bake in HOTTEST spring heatwave as record heat from Continent to set temps soaring**

**Source:** [express.co.uk](https://www.express.co.uk), 27 March, 2021



**UK weather forecast: Hot weather to hit UK over the next couple of days**

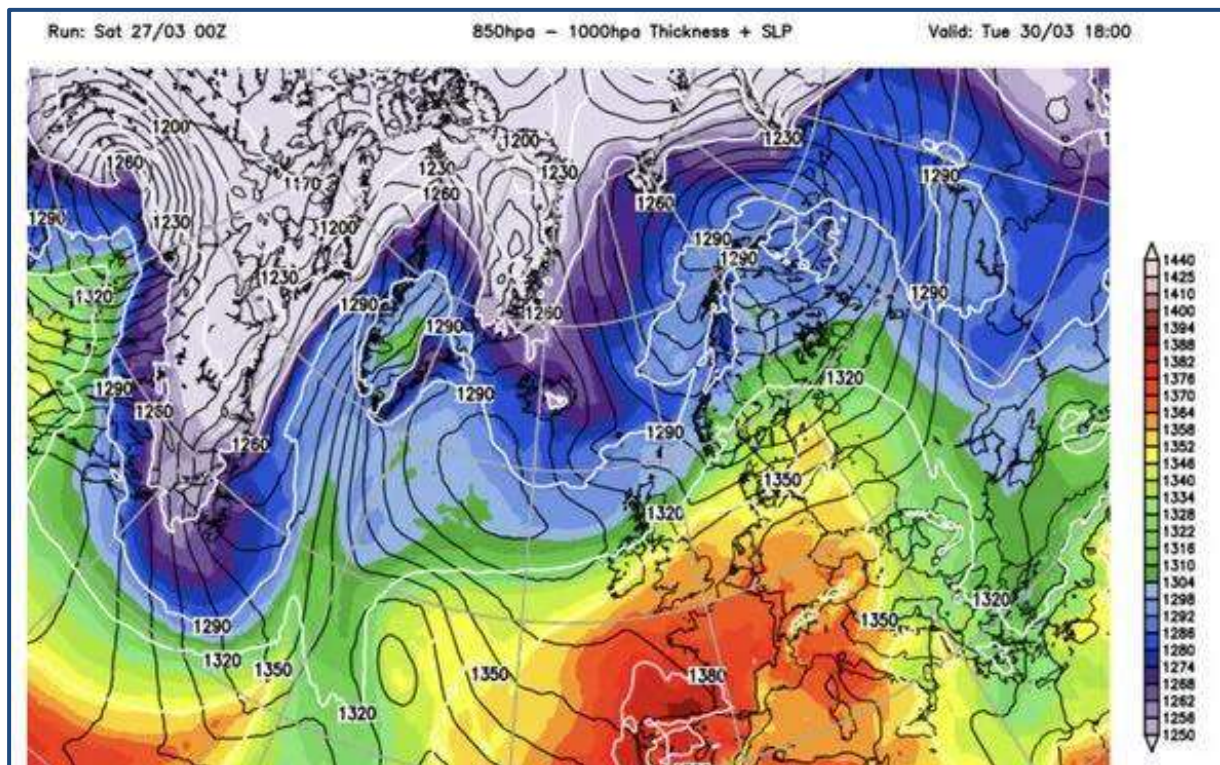
THE UK is about to bake in one of the hottest early spring heatwaves on record as locked-down Britons are finally allowed out to enjoy the sunshine. A sweltering plume from the Continent bolstered by

glorious golden rays will push temperatures towards the mid-

20Cs at the start of next week. Sun-lovers could be set to bake in one of, if not the, hottest March day on record on Tuesday as tropical air engulfs swathes of the country.

However, forecasters warn not to put the woollies away with snow and bitter winds expected to return by Easter. Britons should make the most of the warm weather over the next few days before wrapping back up for winter's parting shot. The mercury is likely to nudge the monthly record of 25.6C (78.8F) on Tuesday—more than 15C above average for the time of year. The record for the highest temperature recorded on March 30 is 23.9C (75F) with 22C (71.6F) the current record for March 31.





**UK weather: Sun-lovers could be set to bake in one of, if not the, hottest March day on record**

Jim Dale, meteorologist for British Weather Services, said: "We could get close to the record temperature for March next week, but it is more likely we will see something around the 24C-mark (75.2F).

"This is being driven by a plume from the Continent bringing a warm southerly flow for a couple of days just after the weekend.

"The warmest days will be Monday with the heat building into Tuesday. This will be a real burst of barbecue t-shirt weather." Spring heat unlike any seen at this time of year for around a century could see daily records for March fall at the start of the week.

The March 30 record of 23.9C was set in Cullompton, Devon, in 1929, while the record for the end of the month was 22.0C logged in Wryde, Cambridgeshire, in 1907.

The overall monthly record of 25.6C was recorded in Mepal, Cambridgeshire, on March 29, 1968, when the mercury soared above the 9C maximum average.

The summer-like surge will arrive as the latest lockdown easing measures kick in allowing up to six people to gather outdoors from Monday.

BBC meteorologist Ben Rich said: "Into the start of next week, this is where the warm weather comes in.

"A south-westerly flow of winds will bring some pretty warm air in our direction from Monday to Tuesday."

Baking sunshine will make it feel like early summer during the start of the week although the glorious weather will quickly fizzle out.

Forecasters predict a major change from Wednesday onwards with snow and icy winds likely to dampen Easter spirits.

Temperatures will crash below freezing in parts of the country through the end of the week and into the Easter weekend.

Lows of -2C largely across northern and Eastern Britain will bring a risk of snow while much of the UK struggles to rise above single figures.

Mr Dale said: "The hot weather at the start of the week really is going to be a very brief burst of joy. "It will start to unwind big time from mid-week onwards and into Easter, and there will be the risk of wintry showers in parts.

"This isn't so unusual though. a White Easter is more common to see than a White Christmas.

"We are going to go from one extreme to the other over the next week, from unusually warm to very cold again."

The frenetic changes in weather will be driven in part by the jet stream swerving chaotically over the UK. Sub-tropical air will flood in towards the jet's southern side at the start of the week before Arctic air pushes down from the north ahead of the weekend.

John Hammond, meteorologist for weathertrending.com, said: "The jet stream is getting a wriggle on. "A feed of sub-tropical air will allow temperatures to build through the early part of the week.

"From midweek, a huge kink in the jet stream will emerge in the Atlantic.

"Temperatures will fall dramatically from the north as Easter approaches and, by Good Friday, northerlies will be making their presence felt nationwide."

Bookmakers are hoping punters will hedge their bets on the warm weather slashing the odds on records falling. Ladbrokes is offering 4-1 from 8-1 on the 1968 record tumbling next week with a less likely 6-4 on the hottest ever Easter Sunday. Spokesman Alex Apati said: "A mini-heatwave is ready to

bake Britain. "There's a chance this month plays host to the hottest March day ever."

Coral is looking further ahead offering 3-1 on the hottest summer on record and 2-1 on the warmest spring. Spokesman Harry Aitkenhead said: "We're going to go through a spell of cold weather now but once that is out the way the temperatures are going to soar and we think there's every chance now of this spring being our warmest ever."

### **8.12 Sindh, Balochistan likely to see first heatwave of the season this week: Met Office**

**Source:** dawn.com,30 March,2021

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**Mainly hot and dry weather is expected during the week, according to the Met Office.**

The Pakistan Meteorological Department on Tuesday issued a heatwave alert for most plain areas of the country for the ongoing week during which temperatures are likely to rise 4-6 degrees Celsius above normal. "Mainly hot and dry weather is expected during the week due to which heatwave conditions are likely in most plain areas of the country," the Met Office said in an [advisory](#). According to the alert, Sindh, southern Punjab, and eastern and southern Balochistan will remain in the grip of very hot and dry weather from Tuesday (today) to Saturday. Temperatures are also likely to rise in most sub-mountainous areas of the country, it said.

"Dust raising winds are expected in Sindh and Balochistan during the period," the advisory added, stating that day temperatures were expected to remain 4-6 degrees above normal conditions in most plain areas. Following the issuance of the alert, the Rehabilitation Department of the Sindh government in a letter addressed to all deputy commissioners of the province asked them to "take necessary precautionary measures to avert any loss of life during [the] heatwave". In 2015, Karachi [experienced](#) the deadliest heatwave Pakistan had seen in over 50 years. Starting June 19 that year, the coastal city witnessed sweltering heat that continued for more than five days and in its wake left over 1,200 people dead and 40,000 suffering from heatstroke and heat exhaustion.



### Precautions that can be taken

Measures that can be taken to avoid heatstroke. — LEAD Pakistan/File

According to the Provincial Disaster Management Authority (PDMA), those living in urban areas are more prone to being affected by heatwaves as urban centres tend to become heat islands. In 2015, 65,000 people were treated at 50 rehabilitating centres in Karachi's most affected — and densely populated — areas.

Making some small changes and taking precautions like avoiding heavy meals and strenuous activity during the hottest hours can help the body better handle the high temperatures. Hydration and running hands under cool water frequently also help in lowering body temperature.



Wearing clothes made from breathable fabric enables the body to cool down.

### **8.13 Pakistan weather update: PMD issues countrywide heatwave alert**

**Source:** geo.tv,31 March,2021

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- PMD has issued a warning regarding the first heatwave of the season.
  - Sindh, Southern Punjab, Eastern, and Southern Balochistan will remain in the grip of very hot and dry weather from Tuesday to Saturday.
  - Temperatures were also likely to rise in most sub-mountainous areas of the country.



**A person sitting underneath a water tap during summers.**

ISLAMABAD: The Pakistan Meteorological Department (PMD) has issued a warning regarding the first heatwave of the season which is expected to hit many parts of the country during the current week, The News reported on Wednesday.

According to the PMD spokesperson, mainly hot and dry weather is expected during the week due to which heatwave conditions are likely in most plain areas of the country.

Sindh, Southern Punjab, Eastern, and Southern Balochistan will remain in the grip of very hot and dry weather from Tuesday to Saturday.



"Dust-raising winds are expected in Sindh and Balochistan during the period with the daytime temperatures remaining above normal (04-06°C) in most plain areas," he noted.

The spokesperson said temperatures were also likely to rise in most sub-mountainous areas of the country.

Following the PMD's heatwave alert, the Sindh government directed relevant authorities to take necessary precautions to avert loss of life.

### **8.14 Spring Heat Wave Sets High Temperature Records Across San Diego County**

**Source:** timesofsandiego.com, 31 March, 2021



**A surfer leaves the waves at sunset near Crystal Pier in Pacific Beach.**

Less than two weeks into spring, a spell of sultry Santa Ana conditions provided a preview of summer in the San Diego area Wednesday.

The dry and warm winds out of the east delivered afternoon highs into the upper 80s and low 90s along the coast and across the inland valleys — warmth exceeding that of the local deserts, according to the National Weather Service.

The gusty heat wave resulted in a record high at Lindbergh Field, where the reading of 88 degrees exceeded the prior March 31 milestone of 84, set in 1945, the NWS reported. Likewise was the case with the maximum

thermometer readings of 89 in Vista (85, 2011) and 88 in Chula Vista (86, 2003).

The hottest spots in the county were Santee, where the mercury hit the 92 mark, and Brown Field, El Cajon, and Poway, each of which recorded 90-degree highs.

It was somewhat cooler in the desert towns of Borrego Springs and Ocotillo Wells, which topped out at 83 and 85 degrees, respectively.

The Santa Ana system — which generated winds up to 57 mph in the mountains, 55 mph in the inland valleys and 35 mph along the coast over the morning hours — will decrease Wednesday evening.

But Thursday will be another warm day, with highs in the 70s and 80s in many areas, the weather service reported.

A weak upper-level disturbance will bring scattered high clouds and a chance for light showers, mainly over the mountains.

Friday through Sunday also will be unseasonably warm, except near the coast, where areas of fog and a shallow marine layer will keep temperatures lower.

A period of cooler conditions will begin early next week, with breezy winds out of the west and the return of a deeper marine layer, meteorologists advised.

### **8.15 Europe's heat and drought crop losses tripled in 50 years: study**

**Source:** [phys.org](https://phys.org), 1 April, 2021

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The severity of crop losses driven by heat waves and drought have tripled in the last fifty years in Europe, according to a study that highlights the vulnerability of food systems to climate change.

Research published recently in the journal *Environmental Research Letters*, looked at agricultural production in 28 European countries—the current European Union and United Kingdom—from 1961 to 2018.

They compared this to data on extreme weather events—droughts, heat waves, floods and cold snaps—and found evidence suggesting "climate change is already driving increasing crop losses in observational records".



### **Cereal crops were the worst affected**

While all four became significantly more frequent over the 50-year time period, "the severity of heatwave and drought impacts on crop production roughly tripled", from losses of 2.2 percent between 1964 and 1990 to 7.3 percent from 1991 to 2015.

The study found that droughts in particular, which are becoming more frequent, are also becoming more and more intense: "the most severe events become disproportionately more severe".

Overall, European crop yields still increased in the period, by almost 150 percent between 1964-1990 and 1991-2015, said lead author Teresa Bras, from the Nova School of Science and Technology in Lisbon. But losses connected to extreme weather were different depending on the crop.

"Cereals, a staple that occupies nearly 65 percent of the EU's cultivated area and is mainly used for animal feed, is the crop most severely affected," said Bras. These showed "consistently larger losses" linked to droughts and heat spells than other crops, the report said, intensifying by more than 3 percent for every drought year.

Researchers said this could be explained by the more widespread irrigation of other crops like vegetables, grape vines and fruit.

Climate change is expected to multiply weather extremes, including heat waves and droughts and the study warned of "ripple effects" from impacts on Europe across the global food system and on food prices.

The study said the punishing heat wave and drought of 2018 in Europe caused a decrease in grain production of 8 percent compared to the average of the previous five years, "which caused fodder shortages for livestock and triggered sharp commodity price increases".

Since the 2015 Paris climate deal, the world has experienced its five hottest years on record. The UN's Food and Agriculture Organization has warned that food production is "extremely sensitive" to climate change.

Earlier this month a study published in the journal Nature Geoscience found that recent summer droughts in Europe were the most severe the region has seen in 2,110 years and noted a sudden intensification since 2015.

In 2019, a report in Nature Climate Change warned that changes in the jet stream sharply increased the risk of heatwaves in regions responsible for up to a quarter of global food production—Western North America, Western Europe, Western Russia and Ukraine.

### **8.16 Egypt's Meteorological Authority warns about heat wave**

**Source:** plenglish.com, 5 April, 2021

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Egypt's Meteorological Authority warns about heat wave Cairo, Apr 5 (Prensa Latina) Egypt's Meteorological Authority warned on Monday about a heat wave in the national territory that will be lasting all week.

According to satellite images, the change in temperature is due to the eruption of an air mass from the south of the Arabian Peninsula, specialists said.

The hottest days will be Tuesday and Wednesday, with peaks around 36 degrees Celsius in Cairo and 38 in the south of the country, accompanied by suspended dust and sand.

However, forecasts indicate that from Friday onwards the values will drop considerably to four to six degrees in the evening, with possible gusts of wind.



Since the beginning of spring, weather conditions drastically change in Egypt, leading to respiratory diseases.

The meteorological authorities recommend the population dressing appropriately, as well as taking all necessary precautions to mitigate the effects of the unstable weather and the expected maritime disturbances.

### **8.17 Israel's first heatwave of the season, or 'Sharav,' to reach peak**

**Source:** [jpost.com](https://jpost.com), 19 April, 2021

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In Israel, the beginning of the hot season is typically marked with strong winds, which locals call "Sharav."

Israelis are feeling their first heat wave of the year this week. Temperatures are expected to reach 32 to 42 degrees, up to 15 degrees above average, with strong east winds.

However, while the weather is supposed to be "unseasonably hot" and humid, it will also be cloudy, easing conditions for beachgoers. White safety flags will indicate that bathing is safe, N12 reported.



In Israel, the beginning of the hot season is typically marked by strong east winds. Temperatures are expected to drop two degrees by midweek and then rise.



**Israelis enjoy the beach on a hot spring day, in Tel Aviv, April 06, 2021**

The elderly and other at-risk populations should avoid direct sun and heat exposure, avoid unnecessary physical exertion, drink water and stay in the shade, the Health Ministry said. Coronavirus regulations remain in force. Masks are required in enclosed spaces, and social distancing and basic hygiene should be maintained, it said.

Updated health and safety information can be found on the Health Ministry's website. Israel's last heat wave caused a record spike in energy use, power outages and wildfires.

### **8.18 Brief heat wave is on the way to Southern California**

**Source:** ocregister.com, 26 April, 2021

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Enjoy the brisk weather while it lasts, if that is your thing – a heat wave is coming later this week and bringing temperatures in the high 80s to low 90s to much of Southern California.

Starting Thursday, according to the National Weather Service, the remnants of a cold front that brought cool temperatures and very light rain to some areas will give way to a ridge of high atmospheric pressure.

Clouds will move out, leading to lots of sunshine. And the high winds coming from over the ocean the last few days will slacken. Temperatures will soar.

“A warming trend is expected mid-week with mostly sunny skies,” said Kristen Stewart, an NWS meteorologist, on Monday. “It will be very hot on Thursday and Friday.”

That would be a big upward swing from the start of the week: On Monday, winds kept things cool across much of the area, with highs staying in the mid- to upper-60s range. By Wednesday, residents can expect temperatures warming up by 10 or even 20 degrees.

On Thursday, Inland Orange County could feel highs of 86, while Pasadena, San Gabriel and Whittier could hit 89. In the Inland Empire, temperatures were expected to breach 90 degrees.

The heat wave could be brief. Once the high-pressure ridge collapses after this week, forecasters said, another cooling period should return.

**Thursday’s forecasted high temperatures:**

- Woodland Hills: 89
- Torrance: 79
- Long Beach: 81
- Pasadena: 89
- San Gabriel: 89
- Whittier: 89
- Santa Ana: 86
- Ontario: 91
- San Bernardino: 95
- Redlands: 93
- Riverside: 93
- Dana Point: 80

## 8.19 Heatwave to continue till Wednesday

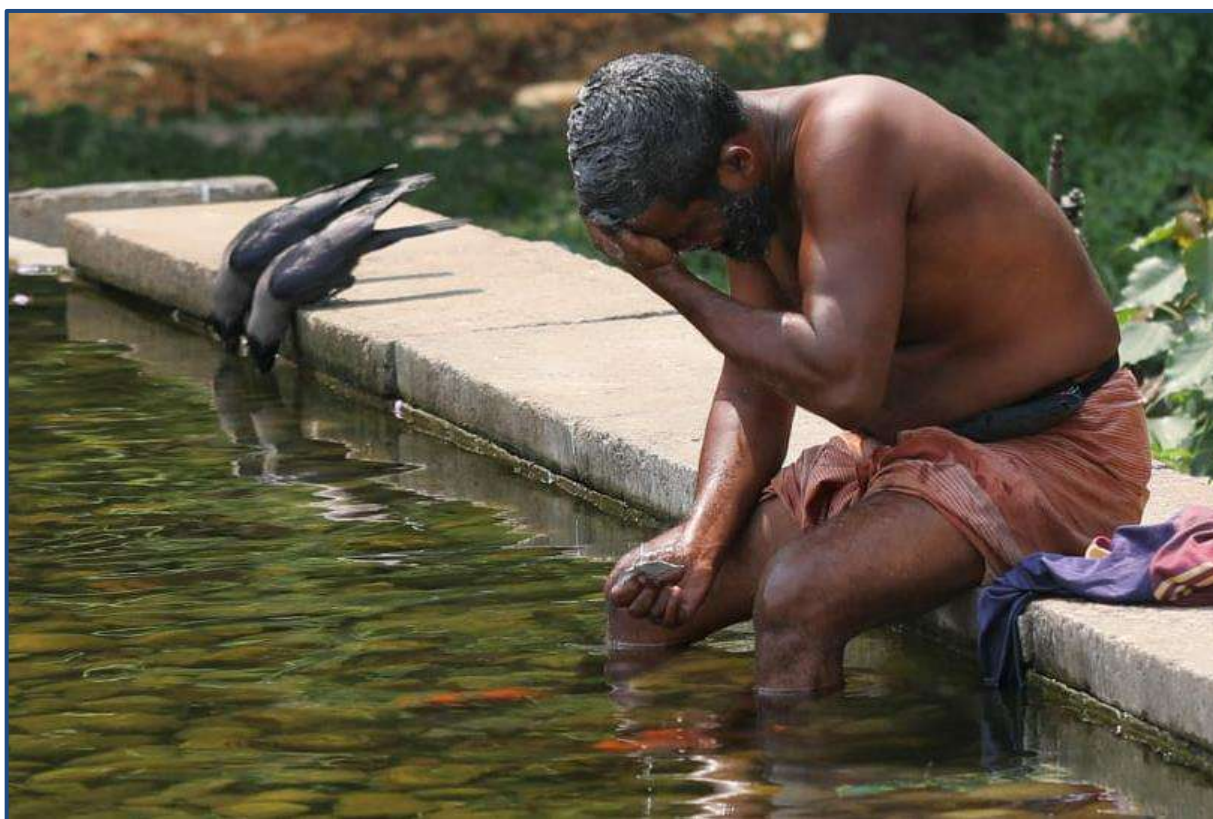
**Source:** dhakatribune.com,26 April,2021

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### Dhaka logs highest temperature in 26 years

The people are not getting any respite from the heatwave sweeping across the country at least in the next two days, says the Met Office.

A mild to moderate heatwave is sweeping over Dhaka, Mymensingh, Rajshahi, Rangpur, Khulna, Barisal, Chattogram and Sylhet divisions, and it may continue until Wednesday, says the latest bulletin of the Bangladesh Meteorological Department (BMD).



### Summer heatwave

Issued at 6pm on Monday, the bulletin forecasts that the weather will remain unchanged until Wednesday.

But the BMD's five-day outlook says that there may be rain or thundershowers, and the day temperature may also fall. The situation prevails as a trough of low lies over West Bengal and adjoining area, with a seasonal low lying over the South Bay. Meteorologist Hafizur Rahman told Bangla Tribune that there is no possibility of the temperature going down this month.

“The heatwave may spread further, instead,” he said, forecasting that the country might see a nor’wester in the first week of May, when the temperature may plummet due to rain. A temperature between 36 and 38 degrees Celsius is considered a mild heatwave, 38 to 40 degrees Celsius moderate heatwave and above 40 degrees Celsius is an extreme heatwave. It is feared that the intense summer heat with no rain will take a heavy toll on seasonal fruits, especially mangoes and lychees, and paddy, with the northern districts already left the worst victims of the heatwave.

### **Dhaka temperature highest since 1995**

Dhaka on Monday recorded a whopping 40.7 degrees Celsius – the highest temperature in 26 years. The temperature last surged to 39 degrees Celsius in 1995. Meanwhile, Rajshahi also saw a hotter day on Monday with the temperature reaching 41.3 degrees Celsius. Bangladesh’s highest ever temperature was recorded at 43 degrees Celsius in 1995. The figure for Dhaka was 42.3 degrees Celsius as recorded in 1960.

Just on Sunday, the country recorded the highest temperature – 41.2 degree Celsius in Jessore – in the last seven years. Media reports say Chuadanga recorded the last highest temperature – 42 degrees Celsius – in 2014.

While Jessore saw the maximum temperature, the lowest – 21.8 degrees Celsius – was recorded in Sylhet’s Srimangal upazila.

## **8.20 UK weather: Britain set for heatwave next month as temperatures soar to 27C**

**Source:** heart.co.uk, 26 April, 2021

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The mercury is set to climb to 27C next month as lockdown restrictions are eased. After a warm weekend for most of us, there’s more good weather on the way.

According to The Weather Outlook, a series of hot spells are expected across Britain in mid May, while temperatures could reach around 27C.

The mercury may even creep into the low 30s as we head into June, with forecasters predicting a very warm summer ahead.

Tim Dale, meteorologist for British Weather Services, said: “There will definitely be some spikes of heat as we go into summer when I expect to see temperatures in the high 20Cs or even the low 30Cs.” Netweather’s long-range forecast also anticipates the start of May could be ‘very warm’, stating: “A finer, warmer perhaps very warm interval may occur, mostly over England and Wales.”





### **The UK could enjoy very warm weather next month**

"A thundery breakdown is possible, before temperatures return to normal with showers, particularly in the North West. "A milder or warmer period, but somewhat unsettled." High pressure from Europe could even push 'sub-tropical' heat towards the UK from May 3 to Sunday, May 9.

The BBC's monthly forecast says: "April looks like it will end on a more unsettled note with scattered showers and light winds expected before drier weather develops in early May. "As May begins our weather will continue to be influenced by a large area of high pressure, known as a sub-tropical high. "As we head into the warmer months of the year, this high will become stronger and larger and tend to be centred near the Azores to the west of Spain and Portugal.

"This year we have unusually warm sea surface temperatures in the Atlantic which have been helping to build this high earlier than normal.

"For the first week of May, the sub-tropical high should strengthen and push into Western Europe, which will bring north-westerly winds for a while and help to keep temperatures a bit below average, at least at the start of the week.

"As the high pressure system shifts east into continental Europe, our cool northerly winds will be cut-off and warmer air from the Atlantic will be able to creep in from the west."



The Met Office adds the period between Thursday, April 29 and Saturday, May 8 could be sunny but unsettled, saying conditions will be 'largely dry and fine' with the possibility of light showers.

### **8.21 Heatwave continues in Bangladesh, no respite in sight**

**Source:** thefinancialexpress.com.bd,28 April,2021

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The people are not getting any respite from the heatwave sweeping across the country at least in the next two days, says the Met Office.

A mild to moderate heatwave is sweeping over Dhaka, Sylhet, Rangpur, Khulna, and Barishal divisions and the regions of Sitakunda, Rangamati, Cumilla, Feni, Rajshahi, and Pabna and it may abate from some part of the country, reports UNB.

Issued at 9:00 am on Wednesday, the bulletin forecasts that day temperature may remain nearly unchanged and night temperature may rise slightly over the country. A trough of low lies over West Bengal and adjoining area, it said.

Rain/thundershowers accompanied by temporary gusty wind is likely to occur at one or two places over Rangpur, Mymensingh, and Sylhet divisions and the districts of Kishoreganj and Cumilla.

The weather may remain mainly dry with temporary partly cloudy sky elsewhere over the country, said the report. But the Met office's five-day outlook says that there may be rain or thundershowers, and the day temperature may also fall. The maximum temperature was recorded 38.5 degrees Celsius on Tuesday at Srimangal while Dhaka experienced 38 degrees Celsius.

## 8.22 Fire Risk High In Calabasas Amid Heat Wave

**Source:** patch.com,30 April,2021



**Along with the unseasonable heat and dry wind gusts, comes elevated fire danger expected to last through Saturday.**

Near-record temperatures will bake parts of Los Angeles, but relief, however short-lived, is in sight.

CALABASAS, CA — The heatwave cooking Los Angeles is expected to continue into the weekend, with 95-degree heat in Calabasas and triple-digit temperatures in the San Fernando Valley. Along with the unseasonable

heat and dry wind gusts, comes elevated fire danger expected to last through Saturday.

Already this week, firefighters have faced several brush fires across the county, confirming expert warnings of a very severe fire season this year as drought, once again, grips California. As a second day of hot dry and windy conditions cook Los Angeles, firefighters are on alert.

"A ridge of high pressure setting up over California will strengthen through Friday," the NWS said. "That ridge will result in well-above-average temperatures west of the mountains and High Desert through Friday, and through Saturday in the low deserts."

Friday will produce the second straight day of higher-than-normal temperatures along with low humidity and wind gusts.

Humidity levels are expected to range between 8 and 15 percent Friday, with north-northeast wind gusts of 35 mph. Areas facing an increased risk of brush fires will include mountain areas along with wind-prone valleys and coastal areas.

"Our climate site in Sandberg broke its record high today (Thursday) by reaching 86 degrees, beating the original of 85 in 2015," the NWS tweeted. "Woodland Hills came super close to record, but was shy one degree. The heat will continue (Friday) before a nice break this weekend."

In Woodland Hills on Thursday, the mercury soared to 100 degrees — one degree shy of the record set 1959.

The forecast called for sunny skies and high temperatures between 90 and 100 degrees in the San Fernando Valley, followed by highs in the 80s on Saturday.

High in the 90s are also predicted for the San Gabriel, Santa Clarita and Antelope valleys as well as Orange County inland areas.

But relief is in sight. By the weekend's end, temperatures are expected to return to normal, the National Weather Service said. On Saturday, temperatures were expected to drop by 10 to 20 degrees in some neighborhoods.

On Saturday, temperatures are expected to hover in the 70s along the coast and the 80s in the valleys. Then another heatwave is expected to hit the region.

"A developing trough over the Great Basin will further increase the onshore flow and a build the marine layer this weekend for more widespread and noticeable cooling, along with night and morning low clouds and patchy fog," the weather service said.

"Westerly winds will become strong and gusty over the mountains and deserts by late Saturday and continue through Sunday.

A warming trend will begin on Monday and continue much of the coming week as high pressure rebuilds over the Southwest."



## **8.23 Heat wave bakes L.A. as temperatures near record highs**

**Source:** latimes.com, 30 April, 2021

A spate of unseasonably warm weather will continue Friday in Los Angeles, with temperatures in some parts of the county expected to climb as high as 99 degrees.



**Firefighters from Los Angeles County Holton Conservation Camp clear brush to establish perimeter control for containment of the North fire near Castaic.**

“It’s enough above normal, I would even call it a heat wave,” said Kathie Hoxsie, a meteorologist with the National Weather Service in Oxnard.

The forecast calls for 99 degrees in Woodland Hills — one degree shy of the record for the day, which was set in 1996. Burbank and Van Nuys could reach 92, while inland areas will mostly be in the 90s, Hoxsie said. The high temperatures are being driven by a ridge over the area that is allowing a hot air mass from the south to move north, she said. On Thursday, Woodland Hills reached 100 degrees. The previous record for the day was 101, set in 1959.

At least one record was broken Thursday, when temperatures in Sandberg hit 86 degrees, the National Weather Service said. The previous record was 85 degrees in 2015. The elevated temperatures could create fire weather

conditions through Saturday, forecasters said, with northeast gusts capable of reaching 35 mph Friday morning and humidity levels hovering below 15%.

Already, small brush fires have broken out in the region, including a 28-acre blaze that prompted evacuations in Thousand Oaks on Thursday and a Castaic blaze that grew to 650 acres Wednesday. The National Weather Service is advising people to stay hydrated and to use caution when spending time outdoors or with any source of flame.

Conditions should start to cool Saturday, Hoxsie said, with temperatures likely to return to the upper 70s and low 80s across the L.A. region. “It breaks pretty quick, and then by Sunday, we’re looking at the 70s across the inland areas,” she said. “So today is it.” The heat wave arrives as experts express concern about ongoing drought conditions across the state, with some warning that meager rains, parched vegetation and above-normal temperatures are paving the way for another severe fire season.

And while temperatures should break this weekend, there are no signs of moisture in the near future. “If we had the chance of rain, we would be shouting that from the mountaintops,” Hoxsie said.

## **8.24 ‘Mini-heatwave’ on its way but not before we’re hit with yet more rain**

**Source:** metro.co.uk, 24 May, 2021

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Although the bad weather is largely set to continue until the end of the month, the forecasts are looking much more positive once we head into June.

Met Office meteorologist Annie Shuttleworth said more settled springtime weather is predicted for next week.

‘We’re pointing towards seeing things settling down from the middle of next week onwards, particularly in the south,’ she added.

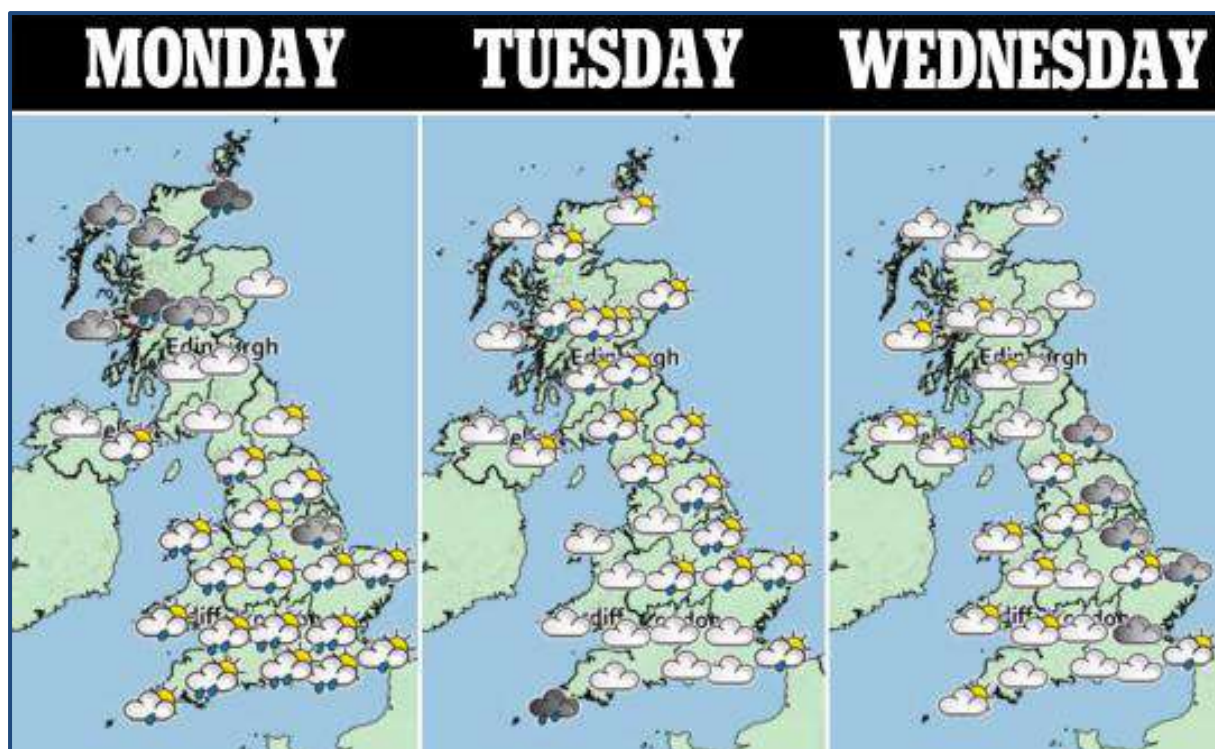
‘There is a good deal of uncertainty in the forecast, but we’re hoping by the end of May we will have much drier and settled weather across the UK.’

She said the long-term forecast suggests June will be much drier than May.

Before then though, central, northern and western parts of the UK are predicted to see heavy rain at least until the middle of this week.

Thunder and lots of rain are expected in parts of south Wales and south England tomorrow, with highs of just 12°C.





**The weather forecast over the next few days still shows showers and rain**

Showers and cold temperatures will remain in the North and across the Midlands this week, with lows of 6°C in Manchester, Newcastle and Edinburgh – below average for this time of year.

But parts of the UK – mainly the South and Wales – are expected to dry up on Thursday, with highs of 19°C in some areas such as London.

Southerly winds could mean sub-tropical Atlantic air may reach Britain after the Bank Holiday weekend, with temperatures possibly hitting 22°C in a ‘mini-heatwave’.

According to the Met Office, a heatwave is an extended period of hot weather relative to the expected conditions of the area at that time of year. This may be accompanied by high humidity.

Average high temperatures for June in the UK are 19°C, so the weather would be slightly warmer than average if it reaches 22°C.

The Met Office predicts ‘much drier’ weather for June overall.

‘The most likely scenario at the moment is looking like predominantly dry weather, at quite a contrast to what we’ve seen with the wet weather in May, so that would be an improvement,’ Annie added.

It comes after a particularly wet spring for the UK, with Wales recording almost double the average levels of rainfall for the whole of May so far.

With travel abroad mostly discouraged due to the pandemic, domestic holiday hotspots are hoping the weather will make a comeback in time for a glorious British summer.

## 8.25 Arctic Heatwave Breaks Records

**Source:** highnorthnews.com, 25 May, 2021



**Floating ice in the Arctic Ocean in September 2020**

As reported by The Independent, a heat wave in the Arctic has broken temperature records in north-west Russia, meteorologists have said. Last Wednesday, the mercury rose above 30C in parts of the Arctic, significantly above the average for the time of year.

Scott Duncan, a meteorologist based in the UK, described conditions as “truly exceptional for any time of the year but mind-boggling for May”. The climate expert added that because the Arctic is warming so fast, “profound heatwaves” are more likely to occur in the future.

Increasing temperatures are causing ice and permafrost to melt in the region, resulting in previously trapped methane being released into the atmosphere and contributing to global heating.

The current heatwave looks set to continue, with climate scientist Zack Labe saying that over the coming week temperatures will be more than 10C above average in eastern Siberia. Still, the temperatures seen this month are well below the hottest ever day in the Arctic, which was the 38C recorded in the Siberian town of Verkhoyansk last year.

## **8.26 Heat wave scorches US West with temperatures smashing 100 degrees**

**Source:** independent.co.uk, 4 June, 2021

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A heat wave is scorching the West of America with temperatures forecast to hit over 100 degrees across California, Nevada, Utah, Arizona, and Washington State.

The National Weather Service (NWS) warned on Monday that “summer has arrived out West with the first significant heat wave of the year.”

Excessive heat warnings and heat advisories have been issued by the service across the areas, who warned that isolated areas could see up to 110 degrees.

According to ABC News cities in Northern California smashed records on Monday with Sacramento reaching 104 degrees while Redding reached 109.

The broadcaster said that on Tuesday Bakersfield, California could see 107 degrees with Las Vegas seeing 105. Residents in Medford, Oregon, and Phoenix could see 104 degrees.

CNN reported that more than 130 heat records could be broken this week in the West as the heatwave sweeps through the areas.

In Las Vegas, the NWS warned that “temperatures will be well-above average this week” with Wednesday to Friday being the hottest days.

In regional areas of California, the service warned of “dangerously hot conditions with high temperatures of 101 to 107 degrees”.

The state, along with southern Oregon, is under heightened risk of fires in the heatwave, with authorities warning residents to be extra cautious with burning outdoors, reports said.

The NWS in Medford, a city in southern Oregon, has issued a fire weather watch, warning of possible lightning and saying that high fire danger could result in new fire starts.

“Please be extra cautious with anything that could start a fire in the coming days by being sure it is no longer burning when you discard it,” the weather service warned.

They added: “Be sure to extinguish all campfires in areas where they are permitted before leaving the area.”

During such high temperatures, the agency says residents should drink plenty of fluids, stay in air-conditioned rooms and away from the sun.

## **8.27 Twin Cities set another record high temp on Saturday as heat wave continues**

**Source:** fox9.com,5 June,2021

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For the second day in a row, the Twin Cities have set a record for the daily high temperature. The temperature at the Minneapolis-St. Paul Airport reached 93 degrees at 12:15 p.m., breaking the high temperature of 92 set in 1911 and 1925. And, the temperature is expected to continue rising in the afternoon, creating the possibility of pushing close to triple digits.

Friday, the airport also set a temperature record as the thermometer pushed to 97 degrees. A Heat Advisory is in effect through the weekend as afternoon temperatures in the metro will climb into the upper 90s, while parts of Western Minnesota climb into the triple digits. Sunday will bring slightly cooler temperatures, in the low 90s, with gusty winds up to 30 mph. Overnight lows through the weekend will stay in the 70s.0

This first heat wave of the season will last for some time so make sure to drink plenty of water and find ways to cool off! And don't forget about the dangers the heat presents when it comes to pets.

## **8.28 Heat wave grips US West amid fear of a new, hotter normal**

**Source:** indiatvnews.com,17 June,2021

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Phoenix, which is seeing some of the highest temperatures this week, tied a record for the second day in a row when it reached 115 degrees (46 Celsius) Wednesday and was expected to hit 117 (47 Celsius) each of the next two days, the National Weather Service said.

An unusually early and long-lasting heat wave brought more triple-digit temperatures Wednesday to a large swath of the US West, raising concerns that such extreme weather could become the new normal amid a decades long drought.

Phoenix, which is seeing some of the highest temperatures this week, tied a record for the second day in a row when it reached 115 degrees (46 Celsius) Wednesday and was expected to hit 117 (47 Celsius) each of the next two days, the National Weather Service said.



### **Heat wave grips US West amid fear of a new, hotter normal.**

Scientists who study drought and climate change say that people living in the American West can expect to see more of the same in the coming years.

“Heat waves are getting worse in the West because the soil is so dry” from the region's mega drought, said Park Williams, a University of California, Los Angeles, climate and fire scientist who has calculated that soil in the western half of the nation is the driest it has been since 1895.

“We could have two, three, four, five of these heat waves before the end of the summer.”

A few clouds were holding the temperatures down slightly in the desert region of southwest Arizona and southeast California, but there was no real relief expected from the excessive heat warning in effect until at least Sunday.

Expecting crowds trying to cool off, a half dozen lifeguards in wide-brimmed straw hats and red T-shirts over swimsuits waited for people to arrive at a city pool in downtown Phoenix that features a water slide and several fountains. Several blocks away, outdoor misters spritzed diners on restaurant patios.

In California, the operator of the state's power grid is asking residents to voluntarily conserve power for a few hours Thursday evening as record-breaking heat blankets the West this week.



The California Independent System Operator issued the alert to help relieve stress on the grid. It asks people to set thermostats to 78 degrees or higher, turn off unnecessary lights and avoid using major appliances. CEO Elliot Mainzer said the grid was stable and there was no expectation of rotating power outages, but that could change as temperatures spike in the coming days.

Higher temperatures also were felt in the normally temperate San Francisco Bay Area. A few cooling centres were open but mostly empty by the afternoon.

Kathleen Craft, shelter coordinator for the city of Livermore, California, said temperatures had reached 99 degrees (37 Celsius) shortly after midday but only one woman had shown up at the city's cooling center.

"We're anticipating we'll see more people tomorrow when a temperature of 108 degrees is forecast," Craft said.

Elsewhere in the West, triple-digit heat was forecast in Denver, which saw a record high of 101 degrees (38 Celsius) Tuesday. The weather service issued an excessive heat warning for parts of western Colorado, most of which is experiencing extreme drought conditions.

Bekka Hamburg was trying to beat the heat by paddleboarding on a lake just west of downtown Denver on Wednesday.

"I rented this (paddleboard) a week ago knowing that it would be like 100 degrees," the 24-year-old visiting from Indianapolis said. "I didn't pack any pants, didn't pack any T-shirts. I just packed tank tops and shorts."

Hamburg said it was the first time she had experienced Colorado's "dry heat," adding that it's much easier to manage than the humid heat common in the Midwest. New Mexico also experienced more record-breaking highs. But a possible respite was in sight with showers and thunderstorms expected in parts of the state.

In Montana, temperatures over 100 degrees (38 Celsius) have made it tougher to fight wildfires that have exploded in size, triggering evacuations and destroying an undetermined number of homes. Furious winds have stoked the flames and forced the crash-landing of a firefighting helicopter. At least 14 new fires have been reported in Montana and Wyoming since Tuesday.

The dry weather was also being felt in Idaho, where authorities are preparing for what could be a challenging wildfire season.

Nick Nauslar, a meteorologist with the National Interagency Fire Center, told state officials this week that nearly 80% of Idaho is in drought and the rest will likely experience it in the coming months. He said Idaho had its second-driest spring in the last 126 years.

### **8.29 Northwest US battles 'unprecedented' heat wave; deaths, power outage reported**

**Source:** hindustantimes.com,30 June,2021

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Washington and Oregon have borne the brunt of the heat wave. President Joe Biden also acknowledged the heat wave during a speech in Wisconsin

As the northwest US battles an "unprecedented" heat wave, officials have said at least more than half a dozen deaths in Washington and Oregon might be due to the heat wave that began last week.

In Oregon, an immigrant from Guatemala who apparently arrived in the US just a few months ago, and was working at a nursery in St. Paul, might have died due to the heat wave, the state's worker safety agency, known as Oregon Osha, said. Also in Oregon, officials in Bend said deaths of two homeless people may have been weather-related. Meanwhile, deaths of four people in Washington's Bremerton were also ascribed to weather.



**A man cools off at a misting station during the scorching weather of a heatwave in Vancouver, British Columbia, Canada on June 27**

The National Weather Service said the "dangerous" weather which led to consecutive days of record high temperatures exceeding 100 degrees Fahrenheit (37.7 degrees Celsius) in both Seattle (Washington state) and Portland (Oregon) is now expected to ease though the agency also said the mercury was recorded at 109 Fahrenheit or 42.2 degrees Celsius in Spokane (Washington)-the highest-ever temperature recorded there.

According to energy corporation Avista Utilities, about 9,300 of its customers in Spokane lost power on Monday, adding that more "planned" blackouts began on Tuesday afternoon. "We try to limit outages to one hour per customer," said Heather Rosentrater, an Avista Utilities vice president.

Explaining why the company had to implement deliberate blackouts, Avista president and chief executive Dennis Vermillion said, "The electric system experienced a new peak demand, and the strain of high temperatures impacted the system in a way that required us to proactively turn off power for customers. This happened faster than anticipated.

US president Joe Biden, while delivering a speech in Wisconsin, also took note of the heat wave in the northwest. "Anybody ever believe you'd turn on the news and see it's 116 degrees in Portland Oregon? 116 degrees! But don't worry, there is no global warming because it's just a figment of our imaginations," Biden said.

Meteorologists have said a "dome of high pressure" over the northwest has led to the intense heat wave in the region. "Human-caused climate change," experts say, has led to the worsening of the heat wave.

## **9. Heavy Precipitation Causing Floods and Landslides**

### **9.1 Parts of Bicol flooded due to rains from tail-end of frontal system**

**Source:** [gmanetwork.com](http://gmanetwork.com), 2 January, 2021

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Heavy rains from the tail-end of a frontal system caused flooding in parts of the Bicol Region on Saturday.

In Bulan, Sorsogon, floodwaters reached almost waist-level, according to a report on 24 Oras News Alert.

Sixty families in low-lying areas were evacuated, with some of them riding in rescue boats.

In Presentacion, Camarines Sur, a landslide blocked a road, forcing motorists to find alternate routes.

In Del Gallego, Camarines Sur, the Mansalaya River overflowed its banks, causing flooding to adjacent areas. Flooding was also reported in Nabua and Buhig in Camarines Sur.

According to PAGASA, the tail-end of a frontal system will continue to bring rains over the Bicol Region, Eastern and Central Visayas, Caraga, Davao Region, and Northern Mindanao on Saturday. Residents were warned of possible flooding and landslides.

The Northeast Monsoon (Amihan) meanwhile will bring light rains over Calabarzon, MIMAROPA, Aurora, Cagayan Valley and Cordillera Autonomous Region.

## **9.2 Heavy Rain Results in Flooding Throughout Albania**

**Source:** exit.al, 11 January, 2021

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Heavy rain has battered Albania for the last few days causing flooding, landslides, damage, and resulting in a number of families being evacuated.

In Elbasan, damage has been reported on several roads including falling debris and small landslides. A school in Labinot Fushe was closed after the roof collapsed due to heavy rain. A school in Gramsh also closed as rivers in the area pose a risk to students travelling to and from the school.



Electricity has gone off in Lunik, Librazhd, part of the customs of Qaf Thane, and in parts of Gramsh and Belsh.

In Lezhe, some 4300 hectares of land is reported to be underwater, flooding villages and roads. It has prevented many from being able to attend school on the first day of term. Large swathes of the City of Lezhe are also underwater as the Drin river burst its banks. In Shkodra, 1823 hectares of land are underwater. The news was announced by the Municipality of Shkodra who also noted that the water level of Lake Shkodra has also increased near Livadeve and Dobrac. Vlora has also been affected with large parts of the city flooded.

### **9.3 Heavy rains flood roads, loosen rocks, landslides**

**Source:** mauinews.com, 19 January, 2021

KAHULUI — Intersections became lakes, traffic lights glitched and flooded roads were covered in rocks and debris as Maui County was drenched by a “heavy rain event” Monday that county officials expect to last into today. Frontal moisture stalling over Maui County on Monday produced the heavy rains, the National Weather Service forecast office on Oahu said. Both Maui and Molokai were under flash flood warnings throughout the day.



**Vehicles drive through floodwaters on Dairy Road fronting U-Haul Moving & Storage of Kahului on Monday morning. Callers reported a couple of stranded vehicles and traffic lights blinking at intersections in Kahului as heavy rain fell throughout the day.**



Mayor Michael Victorino urged visitors and residents late Monday to stay home at least for the night, as evening reports of landslides and fallen trees from the day's rains began to roll in.

At Mile Marker 35 on Honoapiilani Highway in Honokohau, a landslide that included three to five "*washing machine-sized boulders*" blocked both lanes Monday evening, Maui police said. On Hana Highway near the Waianu fruit stand, a landslide cut off one lane of traffic while a fallen tree along Hana Highway near the Keanae Arboretum blocked both lanes, according to Maui County spokesman Brian Perry on Monday evening.

Conditions could improve today, as the Maui County Emergency Management Agency said that rain was expected to be heaviest Monday. The National Weather Service on Monday evening forecast an 80 percent chance of rain today at Kahului Airport, down from 100 percent Monday.

Police and fire officials did not immediately report any major incidents due to flooding as of Monday afternoon.

Fire Services Chief Rylan Yatsushiro said that crews reported to a nuisance flooding call along Holua Drive near Lihikai School. He confirmed that the incident only involved water building in the area and that no residents needed help.

Hawaiian Electric reported several outages, including some on Molokai that affected 450 customers. The outages began around 11:05 a.m. Monday, with the majority of customers online by 4:15 p.m., said Shayna Decker, communications manager for Hawaiian Electric on Maui.

Three remaining customers will have power restored after the weather subsides and a large tree can safely be removed from lines along Kalae Highway, Decker said.

On the Valley Isle, crews responded to two "*small, pocket outages*" Monday morning that affected around 100 customers in Haiku and 45 customers in Kahului.

Haiku customers were brought back online around 6 a.m. after bamboo was cleared from power lines in the area.

Customers in Kahului who experienced an outage around 8:15 a.m. had power back on by 10 a.m., Decker said. The cause of the Kahului outage was being assessed Monday afternoon.

Because of the rains, Kepaniwai Park in Iao Valley was closed around 4 p.m. Monday, or three hours earlier than scheduled due to heavy rain and

flooding, according to the county Department of Parks and Recreation. The park is expected to open at 7 a.m. today.

Baldwin and Hookipa beach parks on the north shore, which were closed from Saturday to Monday due to expected high surf and flooding, will be reassessed this morning by parks department personnel.

The county is asking people not to enter closed park areas or heavy surf, Perry said.

On Molokai, the Puu Alii rain gauge reported 13.6 inches over a 24-hour period ending at 7 p.m. Monday — the most of any location in the county. Lanai saw far less rainfall; one gauge picked up 0.67 of an inch.

On Maui, the wettest area was Puu Kukui in the West Maui Mountains, which reported 8.36 inches of rain over a 24-hour period ending at 7 p.m. Monday, followed by the West Wailuaiki rain gauge in East Maui, which recorded 8.07 inches of rain over the same period.

Other areas that saw high rainfall included Pukalani with 5.69 inches, Wailuku with 5.18 inches and Hana Airport with 5.14 inches. Kahakuloa, Waikapu Country Club and Maalaea Bay all saw more than 3 inches of rain, and all but two gauges on Maui recorded at least 1 inch of rain.

Some residents took advantage of the stormy conditions, including a group of people on bodyboards who were seen sliding down slick greens at Pukalani Country Club.

Heavy rains also swamped typically flooded areas such as the Wakea and Puunene avenue intersection at Christ the King Church, which was several inches deep with water Monday afternoon, causing vehicles to pause prior to driving through.

At the nearby Wakea and Kamehameha avenues intersection, water built up on one portion of the intersection, making left-hand turns onto Kamehameha from Wakea difficult.

Water also flooded the Dairy Road and Hana Highway intersection, according to the state Department of Transportation, which advised residents to avoid the area.

Traffic lights in Kahului also went out at several intersections Monday.

DOT crews were sent out to fix traffic signals and clear debris off of roadways, including Honoapiilani Highway, Hana Highway and Keanu Street in Wailuku.

Crews also headed out to respond to reports of falling rocks in the afternoon and evening, including the landslide in Honokohau and a rockfall on Honoapiilani Highway at Mile Marker 10.5 near Papalaua Wayside Park, according to DOT's Facebook page.

Flooding also closed various roads and intersections for a portion of Monday, police said. Makawao Avenue between Kee Road and Kailili Road was closed but later opened, and some streets in Kihei were shut down Monday morning due to flooding, including Kaonoulu Street between South Kihei Road and Alulike Street, and a portion of South Kihei Road from North Kihei Road to Uwapo Road.

#### **9.4 Homes evacuated in Newcastle Emlyn as rivers flood west Wales towns and villages**

**Source:** itv.com, 21 February, 2021



**Carmarthen has seen significant flooding.**

A number of homes have been evacuated in Newcastle Emlyn after heavy rain brought severe flooding to the area.

Large areas of Wales have been affected by the flooding, with 12 flood warnings and 12 flood alerts remaining in place across the country.

The majority of those warnings are in Carmarthenshire and Ceredigion, where the Rivers Teifi and Towy burst their banks on Saturday.

On Saturday afternoon, Dyfed-Powys Police said its officers, along with crews from Mid and West Wales Fire and Rescue Service, evacuated homes on Teifi Terrace, Adpar.

The area was devastated by major flooding in 2018, when extreme weather brought by Storm Callum affected hundreds of homes and businesses across Carmarthenshire and Ceredigion.

The force said some residents chose not to leave their homes, adding that they were given safety advice.

Chief Inspector Jacqui Lovatt said: "Those who decided not to leave were given appropriate safety advice to move to the upper floor and that any valuables, essentials and food are taken upstairs."

Those who evacuated were offered refuge at an emergency rest centre opened by Ceredigion County Council in Llandysul.

But due to some remaining in their homes and others staying with relatives and friends, the centre was stood down at around 6pm.

Several roads and bridges into the towns that lie along rivers in the two counties have been closed, including the B4459 in Capel Dewi where a landslide occurred.

Data is still being compiled, but a spokesperson for Natural Resources Wales said it believes there are "multiple flooded properties in both the Teifi and Tywi Valleys".

Met Office meteorologist Craig Snell said that between 9am on Friday and 6pm on Saturday, Llyn-y-Fan Blaenau in Carmarthenshire had seen the most rain - some 141.6mm.

The average rainfall for the whole of February in south Wales is 98mm, the Met Office has previously said.

The Met Office has not currently issued any further weather warnings for Wales.

Malcolm Rees, a coracle boat maker in Carmarthen, said one of his sheds was submerged in one metre deep floodwater.

He said his family had been using the shed since the 1930s and in his father's time using it the river had only come in once in 1987.

But Mr Rees added: "In the last couple of years it's been in three of four times".

He said floodwater deposited silt and sediment after draining away, with "sludge" left "everywhere".

"Every time it floods I've got to get a skip and things that are damaged go in the skip," Mr Rees said, whose work on the boats is for heritage purposes.

"It's the businesses in the area that I feel for," he said, highlighting that a nearby garage and joinery were flooded.

Locals have reported a number of businesses flooding in Carmarthen.

## **9.5 Climate change: Snow and ice in Texas, floods and landslides in Scotland, extreme weather is already upon us – Kenny MacAskill MP**

**Source:** scotsman.com, 25 february, 2021

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**A woman wrapped in a blanket crosses a street near downtown Dallas in Texas, where snow and ice caused much of the power grid to collapse and also affected water supplies**

It was early spring but where we were staying, as indeed across the state, it was heat, not cold, that was the issue. So it was a surprise to see recent snow and ice in Texas, where it had been dust and sun before.



But that's as much part of global warming as the increased temperatures which it's reckoned will make parts of the "panhandle state" uninhabitable in years to come. Weather extremes are only going to increase and it's the same here in Scotland.

Out for a walk at the weekend, we came across a golf course that was flooded, and looking more akin to something you'd use for a regatta. Friends told me of other such courses elsewhere. Nearby a house was marooned and it's hard to see how it can ever become inhabitable again. The golf course likewise seems set to be a floodplain for weeks, if not months of the year.

It's why as well as taking action to preserve our planet from extinction, we need to take steps to protect ourselves from the harm we've already done. It may never get as bad as Texas but heavy snows, wild winds and rain deluges are probably here to stay. That work comes at a cost but it needs to be borne and needs to be done. Around the time I was heading to Texas, I was sitting on a parliamentary committee considering the state of the A83. A vital route, its repeated closure through landslides was causing real issues for many communities.

Despite the best endeavours of many and considerable expense, the problem remains. But it won't be the only road to suffer as adverse weather and changes to the terrain affect our communities. In my own patch, the A7 suffered last year and, again, it was weather-related. So global warming isn't just something in the far yonder, it's with us now. It's why we need to change but equally prepare for what we've done.

## **9.6 Brazil's hospitals at risk as climate change brings more floods**

**Source:** globaltimes.cn,9 March,2021

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In December 2020, when physician Victor Heitor Gomes became the health director for Rafard, a municipality 150 kilometers northwest of São Paulo, he knew he had a challenge ahead.

The only clinic in the town of 9,000 had been through hard times: Heavy rains in mid-November 2020 caused part of a meeting room wall to collapse, and a month later more rain flooded other parts of the building, including the operation theater and common areas.

The problems forced the clinic to relocate some services to other rooms - and repairing the meter-wide hole in the meeting room wall had to be put on hold because of the ongoing rain through the Brazilian summer.



**A woman walks into a house of an inundated street after torrential rains flooded multiple areas of Sao Paulo, Brazil, on March 11, 2019.**

Heavier rains and increasingly soaring temperatures have made life tough for doctors in other ways as well, Gomes said.

"They're changing the seasonality of certain diseases. You don't expect to see dengue in the winter, but it's getting more common now," he said.

Extreme weather, like the floods that ravaged the Maria Tereza Apprilante Gimenez Basic Healthcare Unit in Rafard, is increasingly becoming a threat throughout the region as climate change takes hold - and is creating an additional burden on health workers struggling to battle the COVID-19 pandemic.

According to the Pan American Health Organization, almost 70 percent of the 18,000 hospitals in Latin America and the Caribbean are located in areas highly vulnerable to floods, major earthquakes, or hurricanes.

Inundation is the most common threat. Nearly 550 floods hit the region in the two decades between 2000 and 2019, affecting over 40 million people and causing almost \$26 billion in damages, according to a 2020 report from the UN Office for the Coordination of Humanitarian Affairs. Brazil is the most flood-prone country in Latin America, the report said.

## **Heavier rain**

The storms that hit Rafard are a worry as well for nearby São Paulo, the largest city in Brazil and South America. Concrete-filled urban areas act as "heat islands" that absorb and then slowly release the sun's heat, making them hotter than the surrounding rural areas.

In cities like São Paulo, that extra heat combines with humidity rolling in from the nearby Atlantic Ocean to create heavier rain, said Tércio Ambrizzi, an atmospheric scientist at the University of São Paulo.

"The heat lifts and condenses the humidity, making it rain," often more intensely than might happen elsewhere, said the scientist, who coauthored a 2020 study on changing rain patterns in metropolitan São Paulo between 1930 and 2019.

Using data from the Brazilian National Institute of Meteorology, researchers found that heavy rain is becoming more concentrated in shorter periods, while dry spells stretch longer. The changes have been particularly noticeable over the last decade, they said.

In 2014, São Paulo's hottest summer in seven decades, the city's water reservoirs dropped to below 20 percent capacity, in the city's biggest water crisis on record and a serious threat for healthcare facilities.

Extremely heavy rainfall events - the kind that can trigger disasters - have similarly nearly doubled in the last decade compared to 1971-80, researchers found.

The extremes are most apparent in Brazil's southern and southeastern regions, and are a particular problem for heavily populated cities such as Rio de Janeiro and Porto Alegre, which are highly vulnerable to floods and landslides in part because of poor urban planning, Ambrizzi said.

## **Planning ahead**

Eduardo Trani, São Paulo state's environment subsecretary, said his office is aware of the challenges.

A 2009 law passed by the state established a policy to curb greenhouse gas emissions and adapt to climate threats, including an effort to map climate risks in all the state's 645 municipalities.

Almost 250 have been completed thus far.

"The mapping is fine-grained to the scale of neighborhoods so that local city halls can study precautionary measures to take against floods and landslides," Trani said.

What the results so far have found is that basic healthcare units, particularly in the São Paulo metro area, are often situated in flood-prone areas or are surrounded by them. That can be addressed in part by infrastructure changes, such as building floodwalls around hospitals and relocating vulnerable ventilation, heating, and air-conditioning systems to higher ground, resilience experts say.

Having backup power sources - including solar panels or other renewable sources of energy - can also keep hospitals functioning when broader power systems go down in extreme weather.

Mariana Silva, an infrastructure and sustainable finance specialist at the Inter-American Development Bank, said building resilience is also a matter of planning for decades ahead.

"If a hospital is to be built in a place which is highly prone to disasters, we must ask ourselves what we can change in its engineering. You'd be surprised how small changes can make a project resilient," she said.

Shifting designs can add to costs - but ignoring the risks will cost more, she said.

"Making those changes costs extra money - but now Latin American governments know climate change is not a matter of 'if' but 'when,'" she said.

## **9.7 Hawaii governor declares emergency after floods and landslides**

**Source:** theguardian.com, 10 March, 2021

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Hawaii's governor, David Ige, declared an emergency in the US state after heavy rains brought floods, landslides and fear of dam failures, and authorities ordered the evacuation of several thousand people from communities threatened by rising waters.

The move came after a dam overflowed on the island of Maui, forcing evacuations and destroying homes, with the dam's "unsatisfactory" condition leading to it being scheduled for removal this year, the land department has said.



### **A mudslide leaves Kamehameha Highway coated near Pokole Point on 9 March**

“The emergency proclamation makes state general funds available that can be used quickly and efficiently to help those impacted by the severe weather,” Ige said on Tuesday.

Poor weather was expected to run until Friday, he added, and flood advisories stayed in place for a second day.

The emergency declaration covers the counties of Hawai‘i, Maui, Kalawao, O‘ahu and Kaua‘i, the governor’s office said in a statement, while the disaster relief period runs until 8 May.

The Honolulu department of emergency management directed people to leave Haleiwa, a community of a few thousand people, to the north of state capital, Honolulu. About 4,000 have left the area, according to KITV4. Rick Blangiardi, the mayor of Honolulu, warned the flooding near the city was “life-threatening”.

Hawaii News Now reported that two people were swept away in raging waters on Tuesday. One of them, a 27-year-old man, was rescued by authorities. A search for the other would resume on Wednesday, according to the report. There were no other immediate reports of injuries or casualties.



In Maui, heavy rains damaged roads, leaving them impassable, with one bridge completely washed out and another displaced, the governor's office said.

State emergency management officials had said the rains led to the cresting of the Kaupakalua dam in the northern region of Haiku, prompting authorities to open evacuation shelters and urge people not to return home. Six homes were heavily damaged or destroyed, said the Maui mayor, Michael Victorino.

The climate crisis is causing changes to Hawaii's rainfall patterns, according to scientists, with overall levels falling but downpours becoming more extreme when they do arrive. The state is also vulnerable to rising sea levels and more intense storms, which bring flooding and saltwater inundation of freshwater supplies.

“Coastal flooding is a widely recognized threat to low-lying areas,” stated a US federal government climate assessment from 2018. This will pose a “clear threat to communities’ existence” in parts of Hawaii, it added.

## 9.8 Increased flooding in Indonesia linked to deforestation

**Source:** wsws.org, 26 January, 2021

A state of emergency was declared for South Kalimantan, Borneo, as torrential rain triggered flooding and landslides, affecting 342,987 people and bringing the death toll to 21 as of last week.

According to the National Disaster Management Agency (BNPB), 54,950 houses were flooded, and over 70,000 were displaced.

The floods inundated all but 1 of Kalimantan's 13 districts, the worst affected being Balangan, Banjar, Barito Kuala, Central Hulu Sungai, and Tanah Laut with 209,884 hectares of agricultural land being destroyed, according to the Indonesian Farmers Union. Most of the land was active farmland, comprising rice fields, agriculture and fish farming ponds.

Floodwaters also disabled 21 bridges, including the main bridge in Mataraman District, Banjar Regency, hampering rescue efforts. Government officials have described them as the worst floods to hit the province in 50 years.

Initial estimates by the Agency for The Assessment and Application of Technology (BPPT) report total economic losses of 1.349 Rupiah (\$US96.1 million), factoring in long term effects and remediation.



**Rescuers assist an elderly man to climb into their boat at a flooded village in Banjar, South Kalimantan on Borneo Island, Indonesia, in this Saturday, Jan. 16, 2021**

The events occurred in what has been a destructive start of natural disasters to the new year. The BNPB reported a total of 185 natural disasters which had hit Indonesia in the first three weeks of 2021.

“Most are in the form of floods, hurricanes and landslides,” BNPB representative Professor Wiku stated in a press conference this week.

While this is a smaller number than last year, 166 people have died so far in January 2021, as compared to 91 from January 2020.

Weather reports indicate that heavy rains are expected to continue in South Kalimantan until February, and Indonesia's Meteorology, Climatology and Geophysics Agency (BMKG) has warned of an increase in “multiple disaster risks” up until March 2021.

President Joko Widodo travelled to the affected areas last week, inspecting damaged buildings, evacuation efforts and aid logistics. He stated that the floods were the unavoidable outcome of unusually high rainfall, causing the central Barito river to overflow.

His comments prompted rebukes from environmental scientists and advocates, who pointed to the devastating effects of deforestation from palm oil and mining operations. Such activities had led to a reduction in the

storage capacity of the Barito River watershed, leading to more destructive flooding.

Indonesia is the largest producer of palm oil in the world, which is used in many household products. In 2019, Indonesia produced an estimated 48.42 million metric tons of crude palm oil.

Despite efforts to boycott the commodity, the Indonesian government is proceeding with a plan to develop domestic fuel sourced entirely from its palm oil plantations. Currently the biodiesel blend (B30) sold at gas stations contains 30 percent palm oil. In order to better meet domestic fuel demand, the government estimates it will need to establish 15 million hectares of new plantations.

In an interview with Tempo magazine, Indonesian Forum for the Environment (WALHI) of South Kalimantan Director, Kisworo Dwi Cahyono, stated, “If [the President] only blames the rain, it would have been better that he had not come here.”

“South Kalimantan stretches 3.7 million hectares that has 13 regencies and cities, but is burdened by 50 percent mining permits, 33 percent are palm oil fields,” he stated, adding that such an ecological disaster had been repeatedly warned about by the area’s branch office.

“The government is yet again ill-prepared. The people are once again who must bear the consequences,” said Kisworo.

Arie Rompas from the Indonesian section of Greenpeace echoed these concerns to the Australian Broadcasting Corporation (ABC), stating that floods and landslides were among the chief natural disasters in recent years.

“It’s strongly related to the accumulated damage to forests that have an impact on climate change,” he said.

The government’s own research agency, BPPT, confirmed these assessments when it stated that a reduction in high density vegetation in upstream areas had compromised water storage functions, according to the Indonesian Nusa Daily.

In 2019, 324,000 hectares of primary forest was cleared, according to Global Forest Watch. Since 2001 this brings the total land cleared to 9.4 million hectares of primary forest.

In South Kalimantan, two thirds of the natural forest in its water catchment area has been cleared since 1991, according to government data cited by Mongabay, an environmental news website. Greenpeace has recorded a

similar trend using satellite imagery which revealed that 304,000 hectares had been lost between 2001 and 2019.

As well as exacerbating the effects of flooding, the landscape has changed to one highly susceptible to landslides caused by erosion and fragile soil.

The government has doubled down on Widodo's position, dismissing what it claims is "misinformation" and "invalid data" being pushed by other parties.

The environmental director at the Ministry of Energy and Mineral Resources, Lana Saria, went so far as to say that mining activity in the region makes a positive contribution to the forests.

"It in fact improves the capability of the watershed to become a water catchment area," she said.

Mining activity presents serious problems caused by acid mine drainage in which surface water reacts with rocks containing sulphur-bearing minerals, creating sulphuric acid. This can then leach away heavy metals from exposed rocks becoming highly toxic.

Calls for more stringent measures to protect the environment have fallen on deaf ears. Indonesia suffered its first recession in 20 years in the third quarter of 2020. Finance Minister Sri Mulyani estimated a GDP contraction of 1.7–2.2 per cent for 2020 earlier this year and projected a rebound of 4.5–5.5 per cent in 2021.

This rebound is contingent on the government's strategy to scrap legislation for mining companies and plantations that will pave the way for the acceleration of deforestation.

Last year's pro-business omnibus law, rammed through parliament despite popular opposition, revises 26 articles and shreds another seven from the 2014 Plantation Law. Most critical is the relaxing of environmental permits for developers, who are now given slap-on-the-wrist sanctions if found to be without permits and a three-year grace period to obtain them.

Environmental impact assessments are not required unless the operation is deemed to be "high risk", and those found neglecting the environment or lacking firefighting equipment will not lose their permits.

## 9.9 Rescuers hampered by damaged roads, more rain in Indonesia

**Source:** indiatoday.in, 5 April, 2021

After flash floods and landslides swept an island in Indonesia's easternmost province, more rains in the area played spoilsport for rescuers as they were hampered by damaged bridges and roads.

Rescuers were hampered by damaged bridges and roads and a lack of heavy equipment Monday after torrential rains caused multiple disasters on remote eastern Indonesian islands as well as in East Timor.

At least 73 people died and dozens are missing in Indonesia, and 27 deaths were reported in East Timor. A tropical cyclone causing the damage is expected to continue affecting the Southeast Asian nations for days while moving south toward Australia.



**In this image made from video, soldiers and police officers assist residents to cross a flooded road in Malaka Tengah, East Nusa Tenggara province, Indonesia.**

Mud tumbled down from surrounding hills onto dozens of homes in Lamenele village shortly after midnight Sunday on Adonara island in East Nusa Tenggara province. Rescuers recovered 38 bodies and at least five people were injured, said Lenny Ola, who heads the local disaster agency.



Flash floods killed at least 33 people elsewhere and at least 70 are missing in the province, according to the National Disaster Mitigation Agency. Severe flooding also has been reported in Bima, a town in the neighboring province of West Nusa Tenggara, killing two people and submerging nearly 10,000 houses.

Relief efforts were hampered by power outages, blocked roads covered in thick mud and debris, as well as the remoteness of the area on an island that can only be reached by sea which is now surrounded by high waves, said the agency's spokesperson, Raditya Jati.

The bodies of three people were recovered after being swept away by floods in Oyang Barang village, where 40 houses were also destroyed, Ola said. Hundreds of people fled their submerged homes, some of which were swept away by the floodwaters.

In another village, Waiburak, three people were killed and seven missing after overnight rains caused rivers to burst their banks, sending muddy water into large areas of East Flores district, Ola said. Four injured people were being treated at a local health clinic.

The rains also caused solidified lava to tumble down the slopes of Ili Lewotolok volcano and hit several villages. That disaster on Lembata island killed at least 14, while at least 42 others were still buried under tons of the solid lava, said Lembata district chief Eliaser Yentji Sunur. The lava was left after the volcano erupted in November.

Hundreds of people were still involved in the rescue efforts on Monday. Ten districts and the provincial capital of Kupang were affected by flash floods and a landslide that damaged five bridges and several public facilities in East Nusa Tenggara province, Jati said.

He said more than 950 houses were damaged, including dozens that were flattened or swept away by floods and mud, forcing 2,655 people to flee to government shelters.

President Joko Widodo said he ordered his Cabinet ministers and the chiefs of the military, police and disaster agency to carry out emergency response measures as quickly as possible.

"I can feel the grief of our brothers and sisters there caused by these disasters," Widodo said in a televised address, offering deep condolences to the victims.

In East Timor, 13 people were killed in the capital, Dili, and at least 14 bodies were recovered elsewhere in the tiny nation as rains caused

landslides and dams to overflow. "We are still searching for the areas impacted by the natural disasters" and the toll could rise, said Joaquim José Gusmão dos Reis Martins, the nation's secretary of state for civil protection.

East Timor President Francisco Guterres Lu Olo offered his condolences to the victims and asked government officials to coordinate the response.

At least eight people were reportedly still missing and about 8,000 displaced people were evacuated to temporary shelters run by the country's Red Cross, said government spokesperson Fidelis Leite Magalhaes. He urged shops and markets to immediately reopen and people to return to their normal activities.

Tropical Cyclone Seroja has produced high waves, strong winds and heavy rains for the past three days and its effects are expected to last until Friday, said Dwikorita Karnawati, head of Indonesia's Meteorology, Climatology, and Geophysical Agency.

She warned that the cyclone could trigger waves up to 4 meters (more than 13 feet) on Sumba, Flores and Rote islands in East Nusa Tenggara province and up to 6 meters (19.6 feet) in the southern part of the province and in the Banda Sea and Indian Ocean. Authorities were still collecting information about the full scale of casualties and damage in the affected areas, Jati said.

Seasonal rains frequently cause flooding and landslides in Indonesia, an archipelago of 17,000 islands where millions of people live in mountainous areas or near fertile flood plains. Australian forecasters have warned residents in Western Australia state's far north that the tropical cyclone was intensifying and moving toward them.

Seroja, or lotus flower, formed early Monday morning in Indonesian waters and was moving southwest, Australia's Bureau of Meteorology said. It's not expected to affect Australian communities for the next 48 hours, but residents were urged to monitor forecasts.

### **9.10 Indonesia – 5 Dead, 8 Missing After Landslide in South Tapanuli Regency, North Sumatra**

**Source:** floodlist.com, 2 May, 2021

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At least 5 people died and 8 are still missing after landslides hit the Batang Toru hydropower plant area in Marancar, South Tapanuli District, North Sumatra Province, Indonesia on 29 April 2021.



**Search and rescue operations after a landslide in South Tapanuli Regency. Photo: Regional Disaster Management Agency (BPBD) of South Tapanuli Regency**

Indonesia's disaster agency BNPB said the landslides were caused by heavy rainfall in the area. Two buildings and a vehicle were buried in the slide, with 12 people feared missing. Since then search and rescue operations have found the bodies of 5 victims, with 8 people thought to be still missing. The Regional Disaster Management Agency (BPBD) of South Tapanuli Regency said search operations are ongoing but the remote location on steep slopes has made it difficult to use heavy digging equipment.

### **West Java Landslide**



**Landslide in Sukabumi Regency, West Java, Indonesia on 01 May 2021**



Meanwhile a landslide also struck in Ginanjar Village, Ciambar District, Sukabumi Regency, West Java on 01 May 2021. BNPB report that 1 person died after 3 houses were severely damaged. Two other people were injured.

### **9.11 12 dead in flash floods in western Afghanistan**

**Source:** laprensalatina.com,4 May,2021

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Kabul, May 4 (EFE).- Flash floods caused by heavy rains have caused the death of 12 people, including four children, in the western Afghan province of Herat, officials said Tuesday.



Heavy rains overnight caused severe flooding in several districts of Herat province, causing damages to livestock and hundreds of acres of farmland in the villages.

The province's Adraskan district was the most severely affected where "12 villagers including four children and a woman were killed," Herat Governor's spokesperson Jailani Farhad told EFE.

He added that hundreds of domesticated animals of the villagers also perished in the floods while hundreds of acres of agricultural land and orchards of the poor farmers were also destroyed, Jailani said.

Provincial administration has created an emergency response committee in Herat to deal for disaster response efforts in the affected districts.

Flash floods comes a few days after the Afghan Meteorological Department on May 2 issued warnings of heavy rains and flash floods with rainfall of between 10-30mm in 15 of the 34 provinces.

According to the warning, heavy rains are expected to continue until tomorrow and in 23 of the 34 provinces in the country.

Afghanistan often suffers from natural disasters causing the loss of numerous lives, such as the landslides in May 2014 in the north-eastern part of the country that left some 2,000 people dead.

In August last year, nearly 200 people were killed and some 1,000 houses destroyed in floods caused by heavy rains in around dozen Afghan provinces.

## **9.12 UN says heavy rains have impacted some 166,000 people in Somalia**

**Source:** newsaf.cgtn.com, 18 May, 2021

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**Locals wade through a flooded street after bursting of a river in Beledweyne, central Somalia, May 17, 2020. At least 24 people have died while 858, 667 others have been affected by heavy rains and riverine floods in Somalia, the UN Office for the Coordination of Humanitarian Affairs said on May 15.**

The recent torrential rains across Somalia have affected around 166,000 people, the United Nations humanitarian agency said on Monday.



The UN Office for the Coordination of Humanitarian Affairs (OCHA) said while the rains have reduced in some areas, it is alarming that Somalia has been hit by a double climate disaster, with drought declared on April 25 and recent heavy rains causing riverine and flash flooding. According to OCHA, the combined impact of drought and floods is likely to exacerbate the already critical food security situation in Somalia, where more than 2.7 million people are projected to be food insecure. "Furthermore, these climate shocks will cause displacement, jeopardize access to safe water, contribute to an increase of water-borne diseases and negatively impact livelihoods," OCHA said in its latest Floods Update report released in Mogadishu.

The UN said key air and road transportation routes have been affected, impacting on the availability of food supplies and partners' ability to reach affected populations. It said the 2021 Somalia Humanitarian Response Plan requires 1.09 billion U.S. dollars to assist four million people but is only 19 percent funded as of Sunday. On May 9, the UN agency said at least 25 people were killed from May 3 to 9 due to heavy rains which were pounding several parts of Somalia.

### **9.13 Colombia – Thousands Affected by Floods and Landslides**

**Source:** floodlist.com,21 May,2021



**Floods in La Virginia municipality of Risaralda Department, Colombia.**

Officials in Colombia report that over 30,000 people have been affected by floods and landslides across the country over the past 2 weeks. Three people have died and 5 were injured. Around 8 houses were destroyed and at least 2,500 damaged.

The worst of the flooding was in La Virginia municipality of Risaralda Department. On 18 May 2021, Civil Defence reported 800 homes were damaged and 4,000 people affected after the Risaralda and Cauca rivers broke their banks. As of 18 May the Cauca at La Virginia stood at 5.34 metres, which is above orange (2nd of 3) alert level. Areas of Santuario, Dosquebradas and Balboa municipalities also suffered flooding during this time. The government of Risaralda declared an emergency on 19 May and in a statement said that around 20,000 people from 5,000 families were affected and 510 people were staying in shelters in La Virginia.

In Meta Department almost 5,400 people have been affected and 1,100 homes damaged by flooding in various municipalities. On 10 May 2,500 people were affected by floods in Puerto Lleras. During the following days flooding struck in Cabuyaro and Puerto López. The Meta river at Puerto Lopez was above Red (highest) alert levels at 8.73 metres. On 18 May flooding affected 1,000 residents of El Castillo and 150 in Fuente De Oro.

Also on 18 May, flooding struck in Lloró municipality of Chocó Department, affecting 1,650 people, and in Viterbo municipality in Caldas, where 625 people were affected.

Other significant flooding was reported in Orocué in Casanare Department on 13 May; San José Del Guaviare in Guaviare Department on 16 May; La Montañita in Caquetá Department on 17 May; and La Pintada in Antioquia Department on 18 May. Increased levels of the Cauca and San Juan rivers in Antioquia have caused further flooding over the last 2 days, in particular in Venecia, Salgar and Concordia municipalities.

Civil Defence reported 2 people died in a landslide in Bolívar municipality in Cauca Department on 07 May 2021. A third fatality was reported after a landslide in Cucutilla, Norte de Santander, on the same day.

### **Three Rivers at Red Alert**

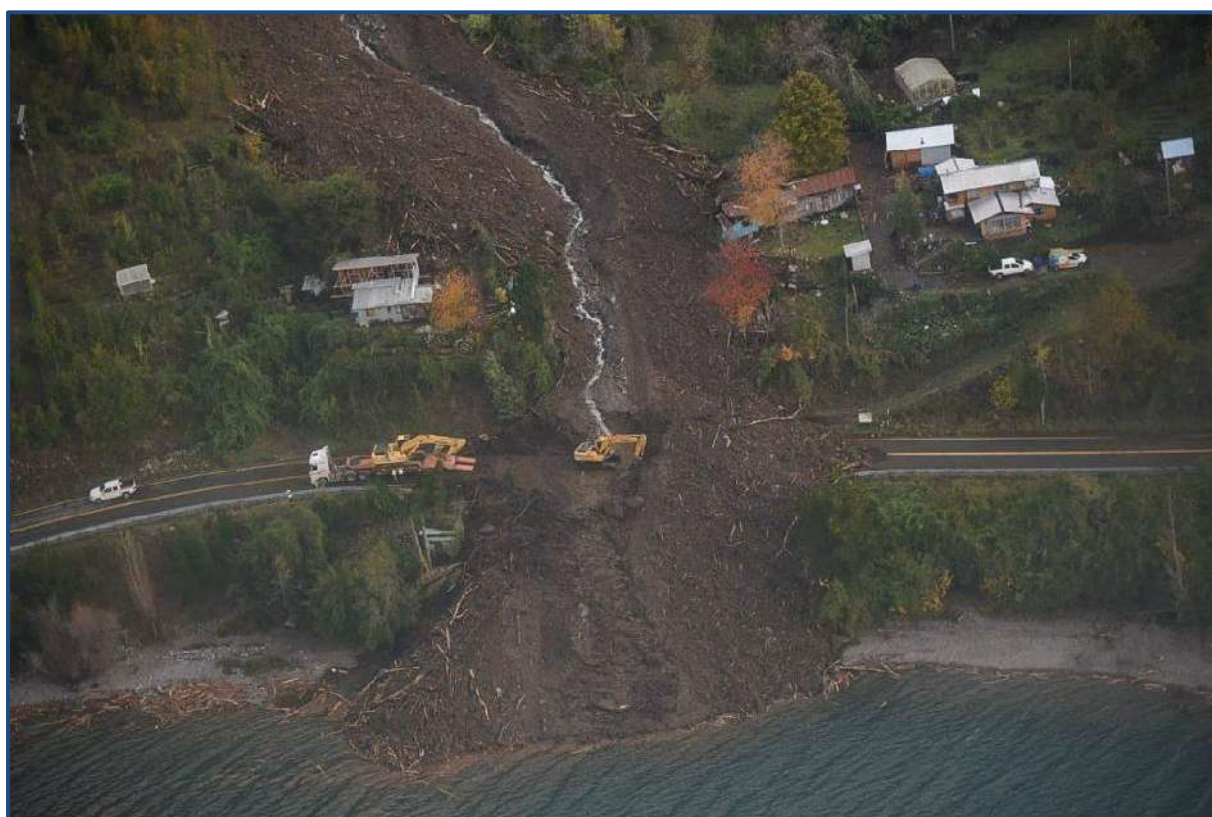
According to Colombia's Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM), as of 21 May 2021, rivers were at the highest alert levels (Red Alert) in 3 locations: the Cauca river at San Jacinto Del Cauca, Bolivar Department; the Magdalena River at Port Nare in Antioquia; and the Meta river at Puerto Lopez in Meta.

Rivers were at Orange (second level) alert in 6 locations and at Yellow Level in 5 locations.

### **9.14 Chile – Floods Prompt Rescues and Evacuations in South-Central Regions**

**Source:** floodlist.com,2 June,2021

Dozens of people have evacuated their homes while others have been left isolated after heavy rain triggered landslides and flooding in Bio Bío, Araucania, Los Ríos and Los Lagos Regions of Chile. Around 15,000 people were left without power.



**A landslide in Panguipulli Commune, Los Rios, Chile.**

Chile's National Emergency Office ONEMI reported the development of the frontal system forecast for the section between the Ñuble and Los Lagos regions on 01 June 2021.

According to figures provided by ONEMI, in a 20 hour period on 01 June, Maquehue in Padre las Casas Commune of Araucania Region recorded 101.9 mm of rain, while Corral in Los Rios recorded 128.9 mm and Concepcion in Bio Bío recorded 77.8 mm.



## **Araucania Region**

Parts of Araucania Region are among the hardest hit. Homes and buildings have been flooded Lonquimay, Padre Las Casas, Purén and Pucón. Thirteen people were airlifted to safety in Cunco Commune due to the flooding of the Curacalco river which damaged access bridges.

Landslides and flood have wiped out roads, leaving communities isolated in Melipeuco, Pucón and Collipulli.

Authorities issued a Red Alert for the communes of Vilcún, Temuco and Padre Las Casas due to the threat of overflow of the Cautín river, which reached 2.8 metres at the Cajón station Vilcún commune on 01 June 2021.

Meanwhile a Yellow Alert was in place for the Toltén commune due to overflow the overflow of the Toltén River. Around 4,000 people were left without drinking water in Queule, Toltén Commune, due to the river's turbidity.



**Landslides and floods have wiped out roads, leaving communities isolated. Photo; Government of Los Rios Region, Chile**

## **Bio Bío Region**

In Bio Bío Region, dozens of home were flooded in Antuco, Talcahuano, Lota and Concepción communes, while in Antuco, 60 people are isolated after a landslide and debris blocked road access to the area.

## **Los Ríos Region**

In Los Ríos Region, 20 people were evacuated as a result of a landslide in Ñisoleufu-Coñaripe in Panguipulli Commune. Six people were injured and 1 house destroyed. Meanwhile the overflowing Gol Gol River has wiped out roads, leaving people isolated in the Commune of Rio Bueno.

## **Los Lagos Region**

Heavy rain caused landslides have also blocked roads in parts of Los Lagos Region. Several houses were damaged by floods in Cochamó and 2 people were evacuated in Commune of San Juan de la Costa.

## **9.15 Landslides and floods kill 18 in Nepal**

**Source:** thehindu.com, 20 June, 2021

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**A general view shows houses partially submerged in mud after the area was hit by flash floods, along the bank of Melamchi River in Sindhupalchok, in Nepal on June 20, 2021.**

At least 18 people have been killed due to landslides and floods triggered by heavy rain across Nepal last week, while 21 others went missing, police said on Sunday.



Torrential rains battered Nepal last week, causing widespread flood and damage to critical infrastructure. Officials said the excess rains had led to the rivers overflowing, which resulted in the widespread destruction.

Rescue and relief operations were being carried out by Nepal Police, the Army, and the Armed Police Force.

At least 18 people, including four women and three children, have been killed across Nepal last week, according to Nepal Police headquarters sources.

Four people were killed in landslides and flood in Sindhupal chowk district, 30-km east of Kathmandu, three killed in Doti and one each in Saptari, Kavre, Gorkha, Kaski, Arghakhachi, Palpa, Pyuthan, Jumla, Kalikot, Bajhang and Bajura districts, they said.

Twenty people went missing in Melamchi area of Sindhupalchowk district and one went missing from Bajura, police said.

Meanwhile, the Tatopani border point in Sindhupalchowk has been closed since Saturday, as roads in Larcha and Kodari Bazaar areas were damaged by the flooded Bhotekoshi river.

The dam of an under-construction bridge in Kanchanpur has been washed away by a flooded Mahakali river on Saturday night. A section of the motorable bridge over the river at Odali, Bhimdutta municipality-12 of the district was destroyed, said District Police Office spokesperson Amar Bahadur Thapa. The floods have caused billions worth loss of properties in the country.

## **9.16 Rescuers search for survivors in landslide-hit Japan town**

**Source:** [aljazeera.com](https://www.aljazeera.com), 4 July, 2021

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Two dead and 20 still missing as rescuers look for survivors after a landslide hits the town of Atami.

Rescuers in a Japanese holiday town hit by a deadly landslide searched for survivors on Sunday, climbing across cracked roofs and checking cars thrown onto engulfed buildings as more rain lashed the area.

Two people have been confirmed dead after Saturday's disaster at the hot-spring resort of Atami in central Japan, with 10 others rescued and nearly 20 still missing, a local government official said.



**Police officers conduct search and rescue operation at a mudslide site caused by heavy rain at Izusan district in Atami, west of Tokyo, Japan, July 4, 2021, in this photo taken by Kyodo**

The landslide, triggered by days of heavy rain, hit on Saturday morning, sweeping away hillside homes and turning residential areas into a quagmire that stretched down to the nearby coast.

“It’s possible that the number of damaged houses and buildings is as many as 130. I mourn the loss of life,” Prime Minister Yoshihide Suga told ministers at an emergency meeting.

“This rainy-season front is expected to keep causing heavy rain in many areas. There is a fear that land disasters could occur even when the rain stops,” he warned.

About 1,000 rescuers, including 140 military personnel, were involved in the relief efforts, a Shizuoka prefecture official told the AFP news agency.

“We are trying our best to search for survivors as quickly as possible while carrying out the operation very carefully as it is still raining,” he added.

Atami Mayor Sakae Saito told rescuers to do their best in the search and rescue efforts, saying on Sunday that the “next 72 hours are crucial”, according to the Kyodo news agency.

### **More landslides feared**

Atami, about 90km (55 miles) southwest of Tokyo, saw rainfall of 313mm in just 48 hours to Saturday – higher than the average monthly total for July of 242.5mm, according to public broadcaster NHK.

Much of Japan is currently in its annual rainy season, which lasts several weeks and often causes floods and landslides.

Scientists say climate change is intensifying the phenomenon because a warmer atmosphere holds more water, resulting in more intense rainfall.

Further downpours are forecast in the coming days across Japan's main island.

"Landslides can occur again and again at the same place even if the rain stops. Residents and rescuers should remain on alert," Takeo Moriwaki, professor of geotechnical engineering at Hiroshima Institute of Technology, told AFP.

NHK said on Sunday that at least seven other landslides had been reported across Japan.

The highest evacuation alert, which urges people "to secure safety urgently", was issued after the disaster in Atami, which has 20,000 households.

About 387 survivors took shelter at evacuation centres, where people wearing masks kept their distance from other families due to fears of coronavirus infection, media reports said.

Residents in many other cities in the Shizuoka prefecture have also been ordered to evacuate.

### **9.17 Heavy rains cause mayhem in parts of China, over 100,000 evacuate**

**Source:** newsonair.com, 12 July, 2021

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China's summer monsoon season has delivered incessant rainfall over the past month, causing rising water levels on the numerous tributaries of the Yangtze River, and posing a major test for the country's flood-control infrastructure. Flooding in southwest China has displaced thousands of people after days of heavy rain and more could be on the way, authorities have warned. As per official media, across Sichuan province, rainstorms have pushed up water levels in 14 rivers, affecting more than 720,000 residents and causing an estimated US\$27 million in damage since Friday.

More than 1 lakh people have been evacuated due to floods and landslides. China has been on high alert since severe floods hit the region in 2020.



“The flood control system in the Yellow River Basin is not yet complete, the dams have weak links, preventing floods on small and medium-sized rivers is difficult, and cadres and the public lack actual

flood fighting experience,” the Ministry of Water Resources said in a statement on Sunday.

Last year saw the worst flooding in decades, affecting tens of millions of people in dozens of provinces and resulting in at least 86 billion yuan in economic losses.

Authorities have warned that the amount of rainfall this year could be even higher, with the Ministry of Water Resources issuing a call in June for flood prevention efforts and for communities to prepare for heavy rainfall that may persist until August. Firefighters have been dispatched across the country for evacuation operations, often rescuing people from their homes and rowing them to safety.

### **9.18 6 Dead, 2 Missing In Floods, Landslides In Northeast Turkey**

**Source:** outlookindia.com, 15 July, 2021

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At least six people have been killed and two people are missing after heavy rains hit Turkey's northeastern Black Sea coast, triggering floods and landslides, Turkey's health minister said Thursday.

The heavy downpour struck the tea-growing province of Rize late on Wednesday, sweeping away cars and causing a number of houses to collapse. Video images from the region also showed mudslides destroying tea plantations.



A 75-year-old woman was found dead amid the debris of her three-story house in Rize's Muradiye district, state-run Anadolu Agency reported.

Rescuers also recovered the bodies of three

people who died after mudslides partly destroyed a wooden house.

The victims also included the head administrator of the nearby village of Asmaliirmak, who died after being swept away by the raging waters, Anadolu reported.

Rescue teams sent to the region were searching for two people who remain unaccounted for, Health Minister Fahrettin Koca said, adding that one other person was hospitalized.

The private DHA news agency said sniffer dogs and divers were aiding the search-and-rescue mission.

The heavy rains also shut down access to dozens of villages and cut off power supplies, it said. More than a hundred people were evacuated from their homes.

Turkey's Black Sea region is frequently struck by devastating torrential rains and flash floods.

## **9.19 Deadly floods and landslides hit Rohingya camps in Bangladesh**

**Source:** [unhcr.org](https://www.unhcr.org/2021/7/28/rohingya-camps-bangladesh), 28 July, 2021

UNHCR, the UN Refugee Agency, is deeply saddened by the tragic deaths of six Rohingya refugees as three days of heavy monsoon rains and strong winds pelted massive refugee sites in Bangladesh's Cox's Bazar on Tuesday, causing flash floods and landslides.

According to initial reports, more than 12,000 refugees have been affected while an estimated 2,500 shelters have been damaged or destroyed.





**Rohingya refugees are paddled to safety at a site in Bangladesh's Cox's Bazar, after heavy monsoon rains triggered flash floods and landslides**

In the last 24 hours alone, over 300mm of rain fell on camps hosting more than 800,000 Rohingya refugees. That's nearly half the monthly rainfall average for July in one day. More heavy downpours are expected in the next few days with the monsoon season stretching over the next three months. The situation is further compounded by the COVID-19 pandemic. There is currently a strict national lockdown in response to rising cases across the country.

In support of the government-led response, UNHCR's network of Emergency Response Teams have been deployed, to provide immediate support and assistance to affected families and to those forced to temporarily relocate. Teams are also assessing the damage to shelters and initiating immediate shelter repairs and site improvements. Ensuring access to essential services for all those affected is another priority.

Refugee volunteers trained by UNHCR, and partners are also working day and night in heavy rain to help families in urgent need. In some cases, this has involved rescuing refugees from shelters destroyed by landslides. So far, more than 5,000 refugees have temporarily relocated to other family member's shelters or communal facilities.

The adverse weather, latest landslides and floods further exacerbate the suffering and massive humanitarian needs of the Rohingya refugees in Bangladesh. To date, the 2021 Joint Response Plan (JRP) for the Rohingya humanitarian crisis in Bangladesh has received only US\$274 million, roughly 30 per cent of the US\$943 million required for the response this year.

## **9.20 Heavy rains from Habagat cause flooding, landslide in parts of Luzon, Mindanao**

**Source:** [gmanetwork.com](http://gmanetwork.com), 9 August, 2021

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The Southwest Monsoon (Habagat) brought heavy rains in recent days, causing flooding and a landslide in parts of Luzon and Mindanao.

The National Highway in Davao City got flooded and was impassable for almost two hours, according to a report by Corinne Catibayan on GMA News' Unang Balita on Monday.

Residents living in areas prone to flash floods and landslides were advised to take the necessary precautions.

In Koronadal City in South Cotabato, shoppers and workers were stranded at a shopping mall due to the heavy rains which came with strong winds.

Other parts of the city were also flooded. Authorities also monitored the water level at a creek which threatened to overflow. Meanwhile, in General Santos City, floodwaters reached knee-deep. A delivery rider got stuck on a flooded road.

The drainage canal at the National Highway crossing Nakar was also flooded and damaged. It was located near a hospital. Some houses also got flooded, which prompted families to evacuate.

### **Luzon**

In Alilem, Ilocos Sur, a barangay kagawad drowned after he tried crossing a river using a raft. His body was found in the municipality of Tagudim.

Authorities said he may have fallen into the river and the current swept him away. In Santa, Ilocos Sur, a motorcycle rider was dead on arrival at a hospital after he got into an accident.

The rider slid while navigating a road as heavy rains fell, and he crashed onto a concrete barrier. He had a helmet on but his head hit the concrete. Meanwhile, a landslide occurred in Tadian, Mt. Province.

Personnel of the Department of Public Works and Highways conducted clearing operations. PAGASA said the Southwest Monsoon will continue to affect the country on Monday.

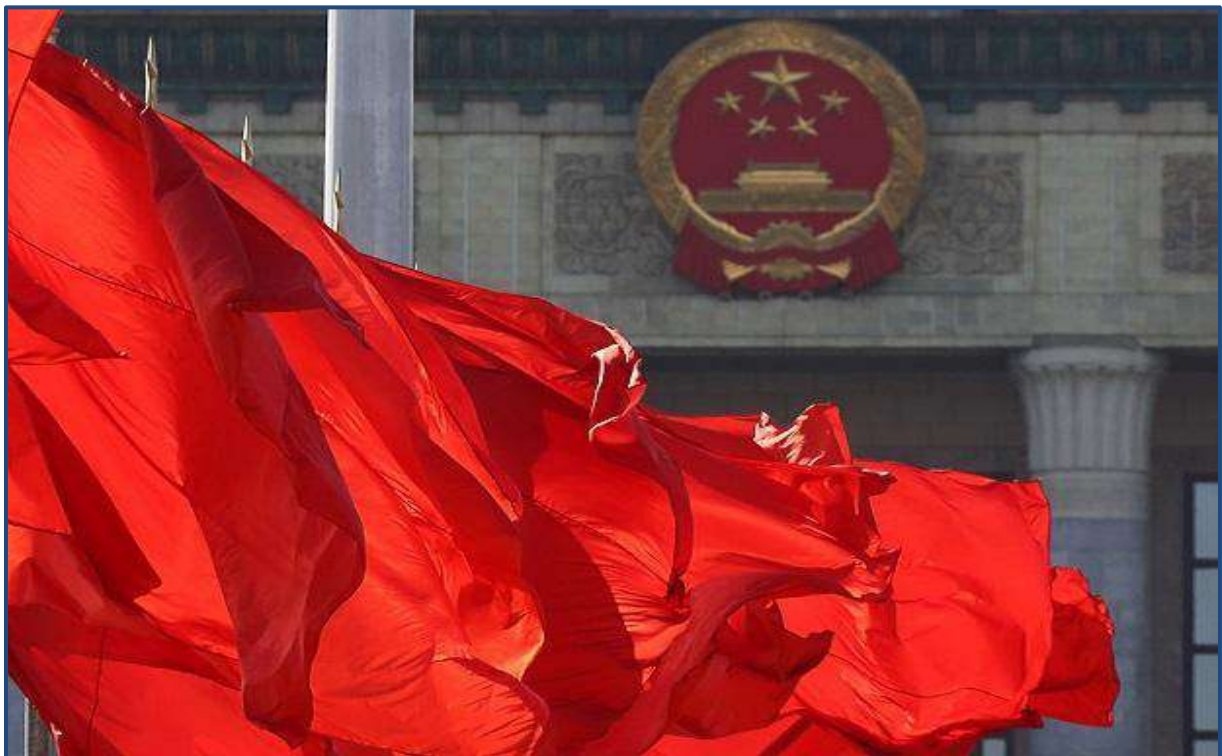
Batanes and Babuyan Islands will have cloudy skies with scattered rain showers and thunderstorms due to the monsoon. The Visayas, Northern Mindanao, and Caraga on the other hand will have cloudy skies with scattered rain showers and thunderstorms due to the trough or extension of a low pressure area located east of Guiuan, Eastern Samar.

Metro Manila and the rest of the country meanwhile will have partly cloudy to cloudy skies with isolated rain showers or thunderstorms due to the Southwest Monsoon and localized thunderstorms.

### **9.21 21 killed, 4 missing as heavy rain hits central China: Officials**

**Source:** business-standard.com, 13 August, 2021

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At least 21 people were killed and four others remained missing as heavy rain lashed a township in central China's Hubei Province, local authorities said on Friday.

The Liulin Township in Suixian County saw the total precipitation reaching 503 mm from Wednesday to Thursday, causing an average waterlogging depth of 3.5 meters, officials said.

Over 8,000 people have been affected in the township, state-run Xinhua news agency reported. Disaster relief and rescue efforts are underway.

China's National Meteorological Centre on Thursday issued a yellow alert, warning heavy rainstorms in some central and eastern parts of the country, calling for precautionary measures. Heavy rains are expected on Friday in parts of Hubei, Anhui, Hunan, Jiangxi and Zhejiang, with up to 200 mm of rainfall in certain areas. Parts of the five provinces are likely to encounter over 80 mm of hourly precipitation accompanied by thunderstorms and gales.

The national observatory has advised local authorities to remain alert for possible flooding, landslides and mudslides, and recommended halting outdoor activities in hazardous areas. China has a four-tier colour-coded weather-warning system, with red representing the most severe warning, followed by orange, yellow and blue.

Over 300 people were killed and 50 were listed missing when heavy floods ravaged Henan province and its provincial capital Zhengzhou city last month.

## **9.22 Japan Floods Indicative Of Climate Change Causing Erratic Rain Patterns, Warn Scientists**

**Source:** republicworld.com, 15 August, 2021

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Scientists warned that climate change is intensifying the risk of heavy rains in Japan and other parts of the world, as a warmer atmosphere holds more water.

As torrential rains continue to trigger floods in wide areas of southwestern Japan, Scientists have warned that climate change may lead to unpredictable rain patterns in many parts of the world. They have also predicted chances of heavy to very heavy rains due to a warmer atmosphere that holds more water. The Japan Meteorological Agency has termed recent rainfall levels as "unprecedented" as they have damaged homes, disrupted transportation and caused a landslide in the southern part of the country. It also alerted of heavy rain and mudslide warnings in the Kyushu region to other parts of Japan, including Hiroshima, as the rain front slowly moved eastward. While in the whole of 2020, the Ureshino town, located in the Saga prefecture, had experienced about 3.3 metres of rain, it has about one metre of rain in just four days.



## **Highest-level disaster alert issued for Kyushu and Hiroshima**

Although the country's worst-affected regions witnessed lesser rains on Sunday, more rain was predicted on Sunday night. Meanwhile, local authorities have issued the highest-level disaster alert for parts of Kyushu and Hiroshima, affecting about 1.4 million people, though evacuation is not



compulsory. Chairing an emergency cabinet meeting, Japanese Prime Minister Yoshihide Suga said that the loosening of ground soil in many areas may lead to large-scale disasters at any time. He also warned of severe rain in many areas across the nation and urged residents to exercise caution and stay in shelters.

## **Landslide warnings issued in 372 municipalities**

The Land ministry of Japan informed that landslide warnings have been issued in 372 municipalities across the country after almost a quarter of them were in Nagasaki. The disaster management agency said that dozens of people in flooded areas in the southern Kyushu region, as well as Hiroshima, had been rescued. It is to be noted here that at least 23 people were killed last month when a wave of landslides devastated the central resort town of Atami. Heavy rain has been dumped across south-western Japan since last week, with more than 500 homes around the country damaged, the disaster management agency said. In 2018, floods and landslides killed more than 200 people in western Japan during the country's annual rainy season.



## **10. Cyclone, Hurricane, Typhoon**

### **10.1 Cyclone Imogen makes landfall on North Queensland coast**

**Source:** 9news.com.au, 4 January, 2021

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**A flooded road near Georgetown in North Queensland.**

Tropical Cyclone Imogen has made landfall in North Queensland, causing damage to buildings, flooding roads and uprooting trees.

The Category 1 system crossed the Gulf of Carpentaria coast just to the north of Karumba overnight, but it has now weakened to a tropical low. The Bureau of Meteorology says the system remains "dangerous" and is warning residents in its path of destructive winds and heavy rain that is likely to lead to flash flooding.

Around 262 millimetres of rain fell at Normanton since 9am yesterday, with falls of 192 millimetres at Mornington Island and 74 millimetres at Kowanyama. Wind gusts of up to 95 kilometres an hour were also detected as it crossed the coast. The State Emergency Service (SES) received 51 requests for assistance in the northern region since midday on Sunday.

More than 90 roads across Queensland are closed, with drivers being warned to avoid flooded crossings. Hundreds of properties also remain without power after electricity was cut overnight. The cyclone is set to weaken as it moves further eastward towards Cairns and Cardwell, but

residents in its path are being warned to prepare for more heavy rain in the days ahead.

"The low is expected to continue moving east-southeastwards in the short term, taking it further inland today," the Bureau said. "Longer term, the system is expected to track more slowly to the southeast towards the North Tropical and Herbert-Lower Burdekin coasts."

## **10.2 Cyclone weakens in central Mozambique, but flooding a threat**

**Source:** apnews.com,23 January,2021

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**Vehicles submerged in flood waters in Beira, Mozambique Saturday, Jan. 23, 2021. The Mozambican port city of Beira breathed a sigh of relief as Cyclone Eloise caused less damage than feared as it passed through, but the danger of flooding remained in a region still recovering from a devastating cyclone two years ago**

JOHANNESBURG (AP) — The Mozambican port city of Beira breathed a sigh of relief Saturday as Cyclone Eloise caused less damage than feared as it passed through, but the danger of flooding remained in a region still recovering from a devastating cyclone two years ago.

“We all feel it’s been much less than what we expected,” said Kobus Botha, head of farming and logistics company Servir. “If you remember in (Cyclone) Idai we all said ‘That’s not too bad,’ but 24 hours later the big waters came.” Idai in 2019 killed several hundred people and displaced well over 100,000.

Ahead of the cyclone’s arrival, the International Federation of Red Cross and Red Crescent Societies warned that at least 100,000 people will be affected.

“Heavy rainfall will persist for over 24 hours,” it said. “The amount of rain will be sufficient to flood low areas of Beira and Buzi. Further flooding may arrive some days later as accumulated water flows down the Pungue and Buzi Rivers from Zimbabwe.”

In a more likely scenario, the IFRC expects 400,000 people to be affected as “torrential rains immediately flood low areas of Beira, Buzi, Nhamatanda, Chibabava and Sussundenga. Accumulation of water in Zimbabwe will flow downstream, enlarging the flooded areas for several days.”

The eye of the storm passed over Beira before dawn on Saturday, having already brought heavy rains to Zambezia province and its capital, Quelimane. The cyclone lost force after making landfall but took out electricity and communications infrastructure in Beira, a city of roughly a half-million people, and surrounding areas.

“The Vodacom network registered a temporary interruption ... cutting off communication for users in the whole of the city of Beira and in certain districts of the province of Sofala,” Vodacom said in a statement.

Electric company EDM said it had turned off power as a precautionary measure after water got into a substation in Beira, local outlet Carta de Mocambique reported.

“Looking from here in the distance you can see all around roof-sheets missing here and there,” Beira resident Ben Van Wyk said. “But the mayor (Daviz Simango) has been a master of preparation. The whole of Beira put sandbags on their roofs yesterday,” as municipal authorities turned a blind eye to taking sand from the beach.

Eloise is the second cyclone to hit central Mozambique this season, after Chalane in December. But since Idai, “people now know what a cyclone is and they take it seriously,” Van Wyk said.

### 10.3 Cyclone in Gulf of Carpentaria chance increases

**Source:** northqueenslandregister.com.au, 25 January, 2021

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#### **A cyclone is brewing in the Gulf of Carpentaria**

A TROPICAL low brewing in the Gulf of Carpentaria is likely to form into a cyclone later this week. Bureau of Meteorology meteorologist Pieter Claassen said the chance of a cyclone forming was increasing as the monsoon trough intensifies over northern Australia.

If it does form it would be named Tropical Cyclone Lucas and would be the third cyclone of the season to form in Queensland waters, following Cyclone Imogen, which formed in the Gulf in early January, and Cyclone Kimi, which meandered along the North Queensland coast without making landfall.

Mr Claassen said it was increasingly likely the tropical low would form into a tropical cyclone later this week.

"Our official tropical cyclone outlook has a moderate chance, so 20 to 50 per cent chance of this low pressure system forming into a tropical cyclone on Wednesday, and if the low pressure system does stay over water beyond that this chance will likely increase as well."

Mr Claassen said the system was expected to be slow moving and travel in an east or south-easterly direction toward Queensland coast. "Systems that



do form in the Gulf of Carpentaria can generally be quite erratic in terms of their movement," he said.

"They're generally slow moving but at the moment the guidance indicates the system will likely move to the east or south-east, but do so very slowly but there is still some uncertainty as to where the system will move over coming days and over the coming week as well." Mr Claassen said monsoon conditions were strengthening over the Peninsula and areas which had already received up to 100mm in recent days could be in for more heavy rainfall as the low develops. He said a strong wind warning would be issued from tomorrow for Gulf waters, with winds in excess of 25 knots likely. Mr Claassen warned the Gulf could also experience abnormally high tides.

"Tides in the Gulf may exceed the highest astronomical tide in the coming days due to increased monsoonal flow, particularly if the tropical low in the Gulf of Carpentaria develops," he said.

#### **10.4 Weather watch: how typhoons in Korea made California wildfires worse**

**Source:** theguardian.com, 11 February, 2021

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##### **Downtown Los Angeles is seen behind a tree burned by wildfire**

Last year California suffered its worst series of wildfires, including five of the most destructive six fires on record, all driven by unseasonal winds. New



research suggests that the driving winds originated from an unexpected source: typhoons in Korea. The study highlights how events in one region can create a domino effect felt thousands of miles away.

A paper by South Korean and American scientists in *Geophysical Letters* points the finger at three massive storms that hit the Korean peninsula in quick succession over August and September.

The researchers say a single typhoon would have little effect, but the unusual combination of three of them over just 12 days was sufficient to perturb the jet stream. This resulted in an effect known as an atmospheric wave train, which crossed the Pacific and changed the pattern of air flow over North America.

The net result in California was a zone with the lowest atmospheric pressures seen for 40 years, with correspondingly powerful and enduring winds. These winds literally fanned the flames, turning minor wildfires into major conflagrations.

The researchers point to the implication of interconnected global weather systems: in future we are likely to see increasing numbers of extreme weather events, some of which may have impacts far beyond the region where they occur.

## **10.5 Philippine Typhoons: American Red Cross Helps Victims Rebuild Their Lives**

**Source:** [reliefweb.int](http://reliefweb.int), 12 february, 2021

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In November of last year, two powerful typhoons struck the Philippines, leading to loss of life, injuries and homes and businesses

Super Typhoon Goni hit the country on November 1, followed by Typhoon Vamco on November 11. The storms affected approximately two million people in eight of the country's 17 regions, causing 98 deaths and nearly 155,000 people to be displaced from their homes. More than 97,000 houses have been damaged, including more than 22,000 that were destroyed.

The hardest hit areas were Catanduanes and Albay provinces. In Catanduanes alone, the storms damaged more than 37,000 houses. Flooding, wind damage and debris from both typhoons have severely affected agriculture and critical infrastructure throughout the region, including roads, schools, health centers and telecommunications.

## **RED CROSS RESPONSE**

The Philippine Red Cross pre-positioned emergency response teams, first aid, hygiene kits and other relief supplies in key areas. Teams helped evacuate people and pets in vulnerable areas to safe evacuation centers. After Goni, Red Cross utility vehicles deployed to rescue and help families to safety. The teams provided relief materials such as food, cooking equipment, tarps, generator sets and tents to communities in need.

First aid responders and trained volunteers searched for missing persons and provided relief across the most affected communities. On top of the physical, emotional and economic toll of COVID-19, consecutive storms disrupted people's lives and livelihoods. Farmland was inundated, crops destroyed, and coastal fishing communities devastated.

The American Red Cross has contributed nearly \$250,000 to assist the Philippine Red Cross with its response to the storms. The aid has helped provide cash and food items to people in need, on Catanduanes island, alongside psychosocial support. The American Red Cross also supports an existing project on Catanduanes to enhance community and household disaster preparedness. On January 31 of this year, the Philippine Red Cross distributed cash grants to people like Dominga Lora, Shielida Tayoto and Marlene Trapago. Here's what they had to say:

Dominga Lora a resident of Barangay Putsan, Baras, Catanduanes was one of the survivors of Super Typhoon Goni. In her 46 years, Goni is the strongest typhoon she has ever experienced. Together with her family, they were forced to evacuate their home. An hour after the onslaught of the storm, she and her husband went back to their house to save whatever was left. Unfortunately, because their house was only made of light materials, only the flooring was left and most of their things were damaged. "Although we were devastated by Super Typhoon Goni, we will stand again stronger, we will build our house better that it can withstand to super typhoons like Goni," she said.

Currently, Lora's family is living in a makeshift house, and is planning to reconstruct their house as soon as possible. Recently, they received a cash grant from the Red Cross and other important assistance. "We are extremely thankful to the American Red Cross for their project here in our barangay, the Community Readiness in Bicol (CRIB) Project. I'm sure that by the end of the project, the community here in our barangay will be more resilient and prepared."

Shielida Tayoto, 44 years old, married with two children, and a resident of Barangay Danao, Baras, Catanduanes, is one of the survivors of Super

Typhoon Goni.. A day prior to the typhoon, her children sought safety at a house designated for evacuation in their village. As the storm hit, she and her husband braved the strong winds in the evacuation house. Upon returning to their home, they found heavy damage.

Tayoto finds fulfilment in helping her neighbors deal with disaster, so she is a volunteer with the Philippines Red Cross. Her family are also recipients of the Red Cross multi-purpose cash grant. "I believe that volunteering with the Red Cross will be a great help not only to my family, but also to the community. I will definitely be an active volunteer here in our barangay. I'm very thankful to American Red Cross for choosing our barangay as one of the core beneficiaries, because through it, our community and the whole barangay will be more resilient and prepared to any kind of disaster."

## **10.6 Philippines readies for flash floods as Surigae intensifies into super typhoon**

**Source:** hindustantimes.com, 18 April, 2021

The Philippines warned of flash floods and landslides as Surigae intensified while on water to become the first super typhoon of 2021.



**In this file photo from 2013, typhoon Haiyan seen pounding south Manila. Haiyan killed more than 6,300 people. The government warned people that typhoon Surigae could intensify into a super hurricane**

The typhoon, locally known as Bising, which now has the strength of a Category 5 hurricane, is over the Philippine Sea to the east of the Bicol region, the nation's weather bureau said Sunday. While the storm isn't expected to hit land, it will bring heavy rains and strong winds to eastern provinces as it moves northwest with top winds of 215 kilometers (134 miles) per hour and gusts of up to 265 kilometers an hour.

The U.S. Joint Typhoon Warning Center has labeled Surigae as a super typhoon, with maximum sustained winds of 165 knots and gusts of up to 200 knots.

"Considering the uncertainty in the track forecast of the typhoon, a westward shift in the current forecast track may result in potentially significant impacts," the Philippine weather bureau said. "The possibility of a close approach scenario is not ruled out."

An average of 20 typhoons pass through the Philippines each year. In 2013, Haiyan killed more than 6,300 people.

## **10.7 Andres becomes the earliest tropical storm on record to form in the Pacific**

**Source:** usatoday.com, 9 May, 2021

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Tropical Storm Andres on Sunday became the earliest named storm on record to develop in the eastern Pacific Ocean, according to the National Weather Service.

The system formed hundreds of miles off the west coast of Mexico, had sustained winds of 40 mph and was moving out to sea at 6 mph as of Sunday morning. It is not expected to threaten land and will probably dissipate within 48 hours, NWS predicted.

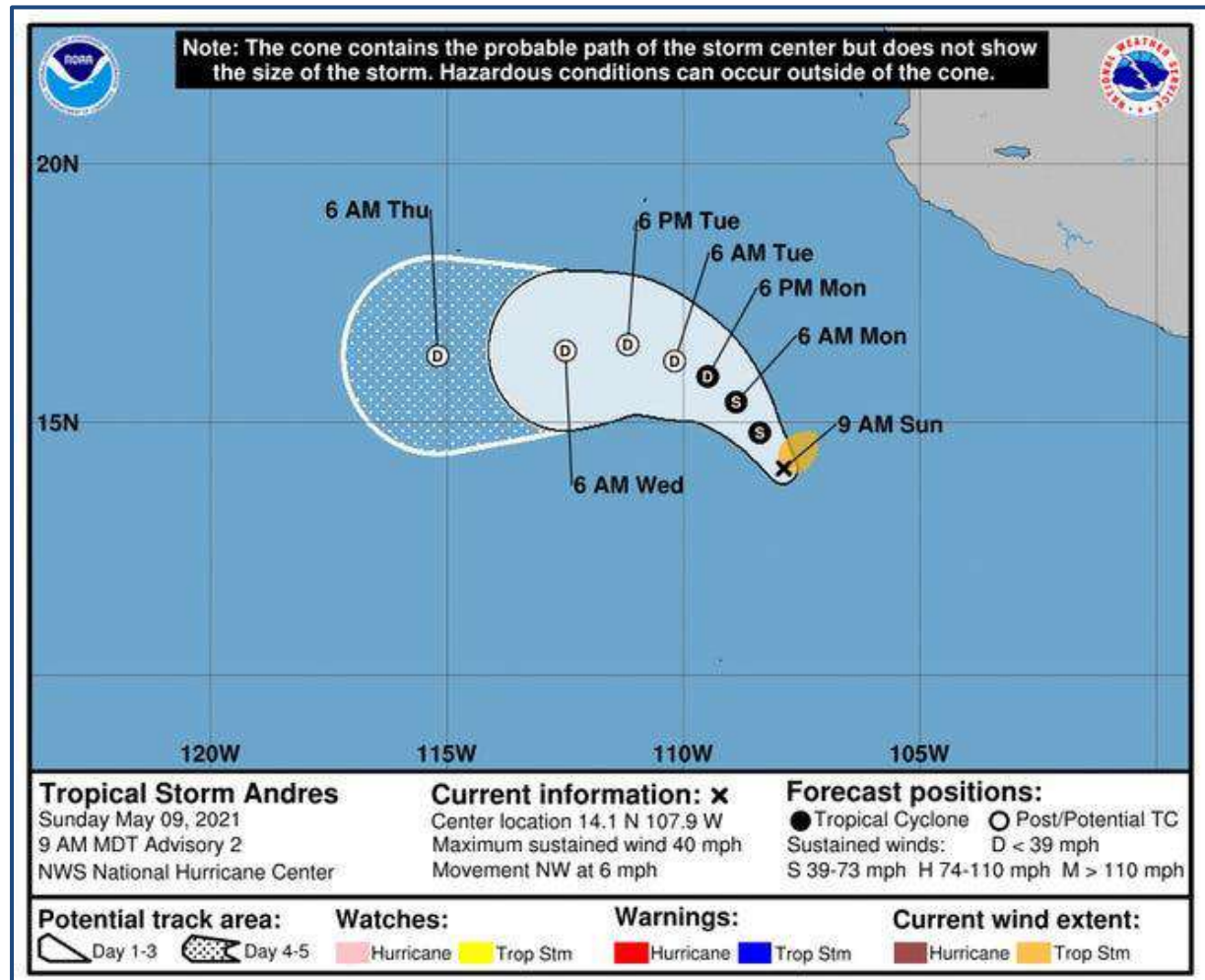
The storm is notable for its early arrival – just beating out the record set by Tropical Storm Adrian, which strengthened to named status on May 10, 2017, according to the National Oceanic and Atmospheric Administration. The eastern Pacific hurricane season runs from May 15 to Nov. 30.

Top forecasters predicted 2021 could pack a wallop with another active, above-average hurricane season. The Atlantic hurricane season runs from June 1 to Nov. 30, though storms sometimes form outside those dates. In fact, storms have formed in May in each of the past six years.

Meteorologist Phil Klotzbach and other experts from Colorado State University expect there will be 17 named storms in the Atlantic – eight becoming hurricanes.

A tropical depression officially becomes a storm when windspeed reaches 39 mph and becomes a hurricane when it hits 74 mph.

An average season has 12 tropical storms, six of which are hurricanes. In 2020, there were 30 named storms, 13 of which were hurricanes.



Scientists have concluded human-caused global warming has strengthened the wind speeds of hurricanes, typhoons and cyclones.

Start date could move: Hurricane season start date could shift earlier because of a surge in May storms

A study published last year examined 40 years' worth of satellite images and found the chances of hurricanes becoming Category 3 or higher have grown, consistent with expectations of storm behavior in response to a warming world.

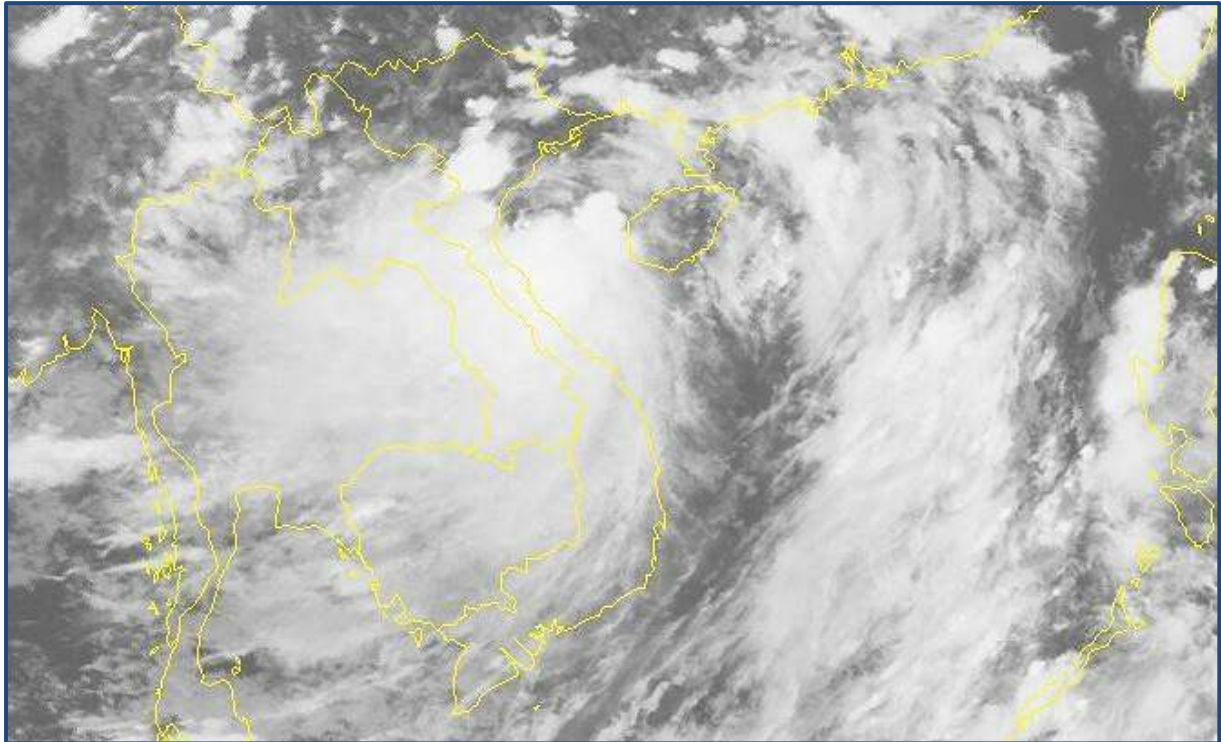
Global warming is caused by the burning of fossil fuels such as coal, oil and gas, which releases greenhouse gases such as carbon dioxide into the Earth's atmosphere. This has caused the planet to warm to levels that cannot be explained by natural factors.



## 10.8 Storm Koguma to make landfall Sunday

**Source:** e.vnexpress.net, 12 June, 2021

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**A satellite image of storm Koguma on June 12, 2021. Photo courtesy of the National Center for Hydro-Meteorological Forecasting**

A tropical depression evolved into a storm Saturday afternoon as it approached the Gulf of Tonkin, forecast to make landfall in the northern region Sunday.

At around 1 p.m., storm Koguma was over the southern part of China's Hainan Island with a maximum wind speed of 75 kph, according to the National Center for Hydro-Meteorological Forecasting. At around 3 p.m., the storm was around 300 kilometers from the Vietnamese shore, the center added.

Within the next 12 hours, it is expected to move west-northwest at 15-20 kph and enter the Gulf of Tonkin. By 1 a.m. Sunday, the storm's eye would be above sea regions from the northern city of Hai Phong to the north central Nghe An Province with a maximum wind speed of 75 kph, it was forecast.

Within the next 24 hours, the storm would make landfall to affect northern Vietnam localities, before devolving back into a tropical depression. By 1

p.m. Sunday, the depression would be above the southern part of northern Vietnam and the Thanh Hoa which borders Nghe An, with a maximum wind speed of 50 kph.

The Japan Meteorological Agency said as Koguma approaches the Vietnamese shoreline, it would have a maximum wind speed of 72 kph.

Until June 14, northern Vietnam and localities from Thanh Hoa to Thua Thien-Hue in the central region should expect rain levels up to 150 millimeters. Certain regions in particular, including Hanoi, Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Hoa Binh, Son La and Phu Tho should expect levels of up to 350 millimeters per bout.

Tran Quang Hoai, head of Vietnam Disaster Management Authority, on Saturday said the storm might not be big but would make landfall in regions with coastal economic activities, so localities must be ready to respond.

The National Steering Committee for Disaster Prevention has instructed localities to ensure safety for all ships and vessels, calling them back to either take shelter in safe zones or stay away from dangerous areas. Depending on the storm's upcoming progression, vessels may be suspended from seafaring altogether.

By 6 a.m. Saturday, over 54,700 vessels with over 225,000 crew members had been informed of the storm's path to get out of harm's way, according to border guards.

## **10.9 Alligator Warning Issued as Tropical Storm Claudette Thrashes Gulf Coast**

**Source:** newsweek.com, 19 June, 2021

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The third named storm of the year, tropical storm Claudette, has thrashed through the Gulf Coast this week, and areas in Louisiana have issued an official warning that citizens watch out for alligators in some of the flooded highways.

Louisiana officials said that with the significant flooding, an influx of alligators swimming up and down the highway has incited complaints from people on the road.

"Highway 23 is open at this time, just watch out for alligators. We got a lot of complaints of alligators in the highway," Plaquemines Parish Emergency Operations Center director Patrick Harvey told WDSU on Saturday.

Harvey confirmed that Highway 23 and Highway 39 in Plaquemines Parish are both open Saturday morning, but officials have received several complaints about alligators and other displaced wildlife.

Louisiana Governor John Bel Edwards issued a state of emergency on Thursday, and the National Weather Service in New Orleans reported Friday that the storm had begun moving closer to the coast.

An area in Alabama was also hit with a tornado in the midst of heavy rainfall and high-speed winds, making storm Claudette the main antagonist in a kind of real-life apocalyptic film.

A tornado warning was issued around 3 a.m. local time in Coden, and WKRG reported that it touched down shortly after, doing damage to the Cedar Point fishing pier near the bridge to Dauphin Island.

The National Weather Service (NWS) reported that a 2 x 4 piece of wood broke free from the pier and smashed into the windshield of a pickup truck. A 911 caller on the scene reported a possible injury, but WKRG said they confirmed with people at the scene, who reported that everyone was okay.

On Friday morning, the National Hurricane Center stated that Claudette is expected to "produce heavy rainfall, considerable flash, urban and small stream flooding beginning today and continuing through the weekend along the Central Gulf Coast with flood impacts spreading northeastward into the Southern Appalachians."

Newsweek reported Friday that some areas are at a 30 percent risk of facing tropical-storm-force winds, exceeding 39 mph.

CNN reported that floodwater has already washed over rural streets and neighborhoods in areas around coastal Mississippi, and residents are "just hoping for the best."

New Orleans resident Cara McCarthy told WDSU: "We just never know what's gonna happen. So (we're) just hoping for the best. We've moved out cars, but we can't move our house. We've got our sandbags ready. We've got our tarp ready and we're just ... hoping for the best."

The National Hurricane Center simultaneously announced around 4 a.m. CT Saturday that a gulf storm previously called a "potential tropical cyclone" had become Claudette, and also that it was centered inland near Houma, Louisiana.

It is forecasted to weaken into a tropical depression by Saturday evening, moving towards the Atlantic where it could turn into a tropical storm over the water by Tuesday, the NWS reported.

Tropical Storm Claudette has spurred Louisiana to issue a warning on alligators swimming on flooded highways. Above, flood waters cover a roadway near structures damaged by Hurricane Laura on October 10, 2020 in Cameron, Louisiana.

## **10.10 Tropical storm Elsa leaves at least 3 dead in Caribbean, heads toward Cuba, Florida**

**Source:** cbc.ca, 3 July, 2021

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Tropical storm Elsa battered the southern coasts of Haiti and the Dominican Republic on Saturday, downing trees and blowing off roofs as it sped through the Caribbean, killing at least three people.

The storm was centred about 225 kilometres east of Kingston, Jamaica, and was speeding west-northwest at 37 km/h. It had maximum sustained winds of 110 km/h as the tropical storm, which had been a Category 1 hurricane earlier on Saturday, weakened in its approach to Hispaniola and Cuba, according to the U.S. National Hurricane Center in Miami.

The storm was forecast to hit Cuba next on a path that would take it to Florida, with some models showing it would spin into the Gulf or up the Atlantic Coast. A tropical storm watch was in effect for the Florida Keys from Craig Key westward to Dry Tortugas.

Meanwhile, Gov. Ron DeSantis declared a state of emergency in 15 Florida counties, including in Miami-Dade County where the highrise condominium building collapsed last week.

One death was reported in St. Lucia, according to the Caribbean Disaster Emergency Management Agency. Meanwhile, a 15-year-old boy and a 75-year-old woman died Saturday in separate events in the Dominican Republic after walls collapsed on them, according to a statement from the Emergency Operations Center.

### **Extensive damage in Barbados**

The deaths come a day after Elsa caused widespread damage in several eastern Caribbean islands as a hurricane, the first of the Atlantic season.

Among the hardest hit was Barbados, where more than 1,100 people reported damaged houses, including 62 homes that completely collapsed as the government promised to find and fund temporary housing to avoid clustering people in shelters amid the pandemic.



**Debris from a house is seen next to a road after strong winds from tropical storm Elsa passed St. Michael, Barbados, on Friday**

Dozens of trees and power lines lay strewn across Barbados, where several schools and government buildings were damaged and hundreds of customers were still without power on Saturday, according to officials.

"This is a hurricane that has hit us for the first time in 66 years," Prime Minister Mia Mottley said Saturday. "There is no doubt this is urgent."

Barbados suspended classes until Wednesday and expected to reopen its international airport on Sunday.

**Food, water running low in Haiti**

Downed trees also were reported in Haiti, where authorities used social media to alert people about the storm and urged them to evacuate if they lived near water or mountain flanks.

"The whole country is threatened," the Civil Protection Agency said in a statement. "Make every effort to escape before it's too late."

Haiti is especially vulnerable to floods and landslides because of widespread erosion and deforestation. In addition, a recent spike in gang violence has forced thousands of people to flee from their homes, so the civil protection



agency is running low on basic items including food and water, director Jerry Chandler told The Associated Press.

"It's been three weeks that we've been supporting families who are running away from gang violence," he said. "We are working at renewing our stocks, but the biggest problem is logistics."

He said officials are still trying to figure out how to deliver supplies to Haiti's southern region, which braced for Elsa's impact.

Meanwhile, people bought water and food before the storm approached.

"I'm protecting myself the best that I can. Civil protection is not going to do that for me," said Darlene Jean-Pierre, 35, as she bought six jugs of water along with vegetables and fruit. "I have other worries about the street.... I have to worry about gangs fighting. In addition to this, we have a hurricane."

### **Cuban provinces under hurricane watch**

A hurricane warning remains in effect from the Haitian capital of Port-au-Prince to the southern border with the Dominican Republic. A hurricane watch was issued for the Cuban provinces of Camaguey, Granma, Guantanamo, Holguin, Las Tunas, and Santiago de Cuba. Some of those provinces have reported a high number of COVID-19 infections, raising concerns that the storm could force large groups of people to seek shelter together.

"Anticipating is the key word," said Cuban President Miguel Diaz-Canel, adding that vaccination efforts would continue. "Let's take care of lives and property."

In the neighbouring Dominican Republic, which shares the island of Hispaniola with Haiti, authorities opened more than 2,400 shelters as forecasters warned of heavy rains.

Some worried about the state of their homes, with many living under corrugated roofing.

"I have a lot of leaks in my zinc," said Maria Ramos. "What are we going to do? Only God knows."

### **Heavy rain in forecast**

Meanwhile, officials on Saturday reported at least 43 homes and three police stations damaged in St. Vincent and the Grenadines, which also suffered massive volcanic eruptions that began in April.

"We expect that this number will increase as reports keep coming in," said Prime Minister Ralph Gonsalves. "We have some damage, but it could have been far worse."

In St. Lucia, the wind damaged a secondary school, pummelling desks, overturning chairs and sending papers flying after blowing off the roof and siding.

Elsa was the first hurricane of the Atlantic season and the earliest fifth-named storm on record. Elsa also broke the record as the tropic's fastest-moving hurricane, clocking in at around 50 km/h on Saturday morning, according to Brian McNoldy, a hurricane researcher at the University of Miami.

It is forecast to drop 10 to 20 centimetres of rain with maximum totals of 38 centimetres across portions of southern Hispaniola and Jamaica.

### **10.11 Typhoon Nepartak forms; heading directly toward Tokyo**

**Source:** kxan.com, 23 July, 2021

AUSTIN (KXAN) — While already trying to overcome a one-year delay and juggling athlete and spectator safety due to the COVID-19 pandemic, Tokyo Olympic Games organizers have another hurdle coming their way: a typhoon.



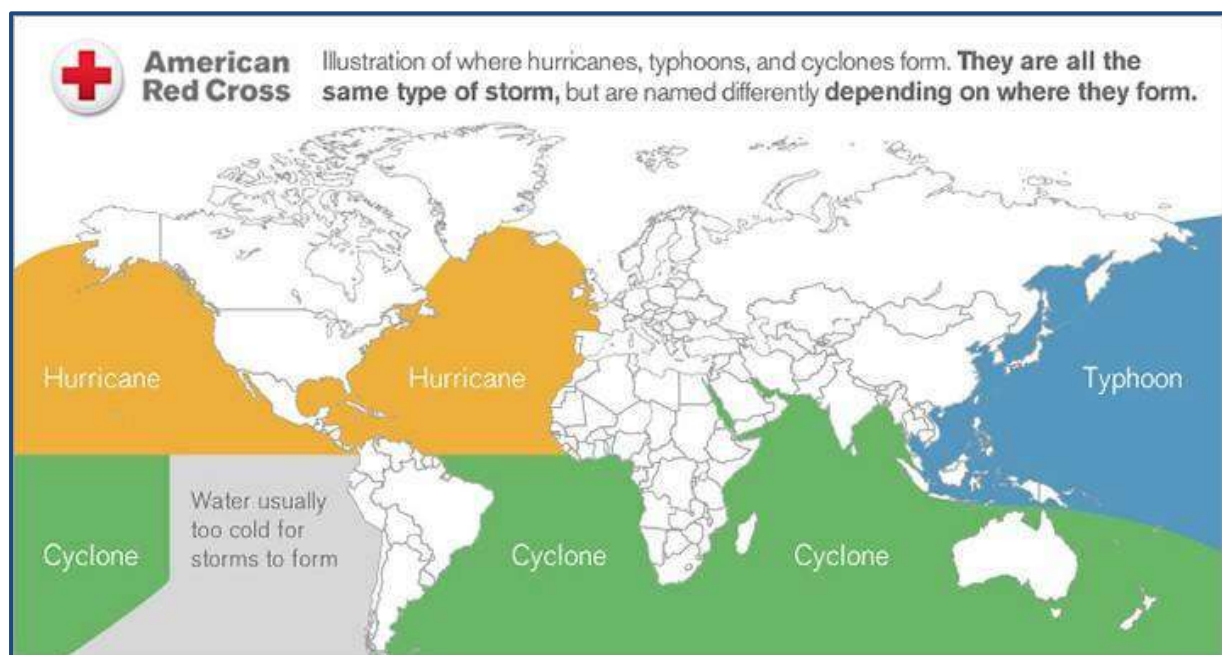
Typhoon Nepartak formed late Friday (Japan time) and is forecast to intensify over the coming days.

The Japan Meteorological Agency (JMA) is expecting the storm to move northwestward, directly toward Tokyo, host of the 2020 Summer Olympic Games. The most likely time for potential landfall in Japan appears to be Tuesday. Ironically enough, the Olympic surfing finals are scheduled to take place on Tuesday.

The JMA forecast keeps Typhoon Nepartak as a the equivalent of a tropical storm (weaker than a hurricane) through Tuesday as it approaches Japan.

The European forecast model (above) as well as the official track from the Joint Typhoon Warning Center (U.S. Navy forecast) suggest a more northerly track, potentially bringing landfall north of Tokyo. Even on this forecast, however, Tokyo remains within the cone of uncertainty as to where the storm's center may track.

Heavy rain, flooding and potentially damaging wind are all possible with this storm.



**American Red Cross illustration of tropical naming differences worldwide**

### **In Depth: What is a typhoon?**

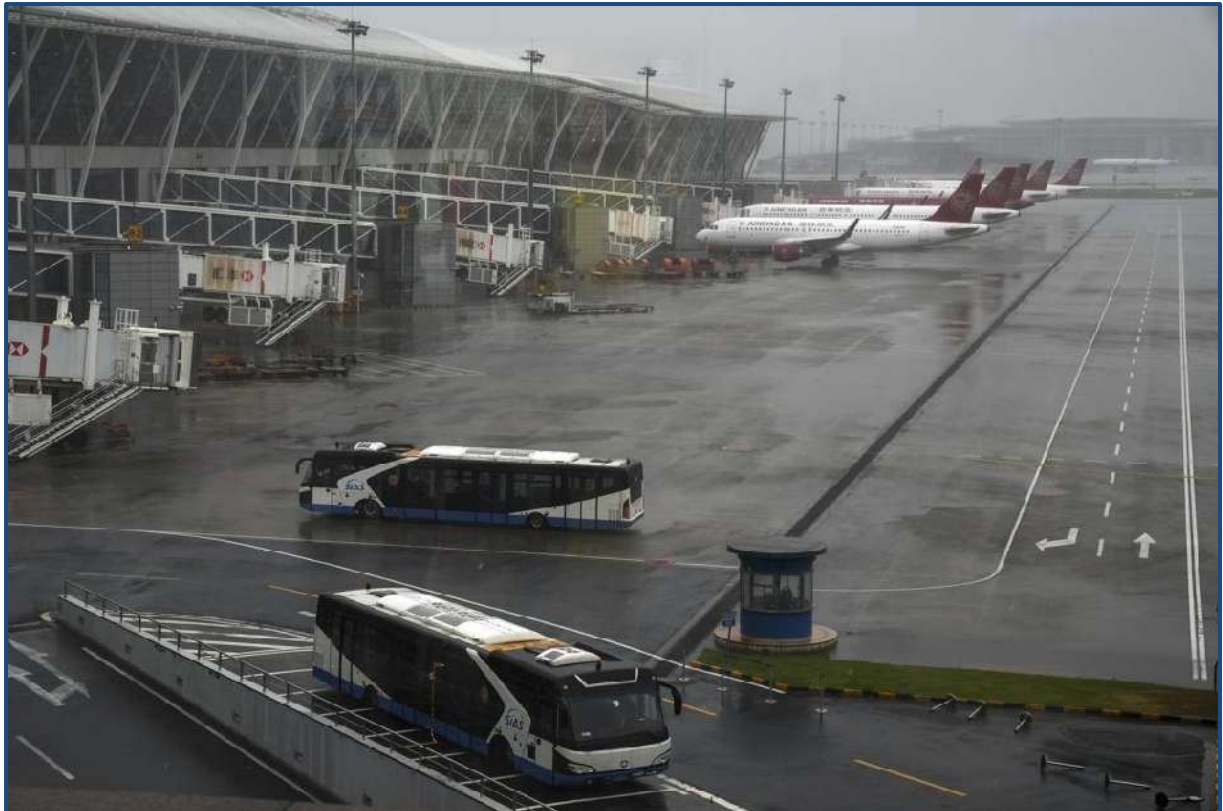
The name “typhoon” is given to stronger storms in the western Pacific. Other parts of the world use the word “hurricane” or “cyclone.”

The international standard definition for a typhoon is wind speeds of 64 knots or 74 mph, the same definition as a Hurricane.

Japan has a different definition for a typhoon. In Japan a storm is considered a typhoon with wind speeds of 34 knots or 39 mph, the same definition as a Tropical Storm.

### **10.12 Typhoon In-fa hits east coast of China; flights, train services cancelled**

**Source:** indiatoday.in, 25 July, 2021



**Buses, passenger airplanes parked on the tarmac after flights were canceled at Pudong International Airport in Shanghai, China.**

Typhoon In-fa hit China's east coast south of Shanghai on Sunday, after airline flights and trains were canceled and the public was ordered to stay indoors. The typhoon made landfall in Zhoushan in Zhejiang province, state TV reported, citing the national weather agency. It forecast rainfall of 250-350 millimeters (10-14 inches).

"People should not willingly go outdoors," the bureau said. The typhoon was packing winds of 155 kilometers (95 miles) per hour and gusts up to 191 kph (120 mph) when it dumped rain on Taiwan. It knocked down tree branches but no deaths or injuries were reported.



Hundreds of flights at Shanghai Pudong and Shanghai Hongqiao airports were canceled and more were expected to be canceled on Monday, state TV reported. Shanghai closed parks and the riverfront Bund district, a popular tourist area.

Train service to Ningbo, a port city south of Shanghai, was suspended, according to state TV. The Zhoushan Bridge that connects islands near Ningbo was closed, as were schools, markets and businesses in Zhejiang province. On Saturday, large container ships were moved from Yangshan Port in Shanghai, one of the world's busiest shipping centers. State TV said a ship lock in Nantong, which abuts Shanghai to the north, stopped releasing vessels into the Yangtze River.

Meanwhile in central China, the death toll rose to 58 after record rains hit the major city of Zhengzhou on Tuesday, state TV reported. The rains flooded a Zhengzhou subway tunnel where at least 12 people died, knocked out power to a hospital and other buildings and left streets filled with mud. Rescuers used bulldozers and rubber boats to evacuate residents of areas that still were underwater, according to the Shanghai news outlet The Paper.

### **10.13 Hurricane Ida barrels down on Louisiana amid warnings of 'life-altering storm'**

**Source:** theguardian.com, 28 August, 2021



**People pick up sandbags at the Dryades YMCA on Friday in New Orleans, as residents prepare for Hurricane Ida.**



Hurricane Ida rapidly gained strength on Friday evening as communities in southern Louisiana braced for a major category 4 storm with sustained winds of about 140mph and tens of thousands of residents were placed under mandatory evacuation orders.

The hurricane is due to make landfall in the US on Sunday, with officials warning of a “life-altering storm”. The cities of New Orleans and Lafayette, as well as the state capital, Baton Rouge, are under threat from Ida, which is forecast to reach the US somewhere between the parishes of Terrebone and St Mary, slightly west of New Orleans.

“Hurricane Ida is rapidly intensifying and the situation is changing, it seems, by the hour,” said John Bel Edwards, the governor, at a briefing on Friday evening. “Now is the time to finish your preparations. By nightfall tomorrow night, you need to be where you intend to ride out the storm, and you need to be postured as you would want to be as the storm approaches you.”

Ida made its first landfall Friday afternoon on Cuba’s southern Isle of Youth. The Cuban government issued a hurricane warning for its westernmost provinces, where forecasters said as much as 20in (50cm) of rain could fall in places, possibly unleashing deadly flash floods and mudslides.



**People drive under the rain in Havana on Friday as Hurricane Ida passes through Cuba**

In Louisiana, there were mandatory evacuation orders in place for a number of parishes surrounding New Orleans, including St Charles, Terrebone and Lafourche, as the New Orleans mayor told reporters she was ordering mandatory evacuations of those living outside of the city's levee protection system and advised many of those inside to leave as well.

"The bottom line and the greatest takeaway is we do have a major storm heading our way," LaToya Cantrell said on Friday afternoon, adding that the city was "activating every single resource at our disposal ... to respond". On Friday evening the National Hurricane Center (NHC) warned of life-threatening storm surge of up to 15ft in parts of coastal Louisiana. The NHC advised those in the storm's path: "Actions to protect life and property should be rushed to completion in the warning area." It warned of heavy rainfall in south-east Louisiana and coastal Mississippi and Alabama of up to 15in.

The storm was traveling at 15mph with continuous winds of 80mph on Friday afternoon, with expectations it would rapidly gain speed. Coastal Louisiana was expected to experience tropical-storm-force winds by Saturday evening, leading officials to cancel a preseason NFL match between the New Orleans Saints and the Arizona Cardinals scheduled for Saturday. Ida became the ninth named storm of the Atlantic hurricane season on Thursday as it formed in the Caribbean Sea on Thursday. New Orleans offered residents free sandbags, prompting lines of people to arrive at a number of locations throughout the city, as many people chose to wait the storm out.



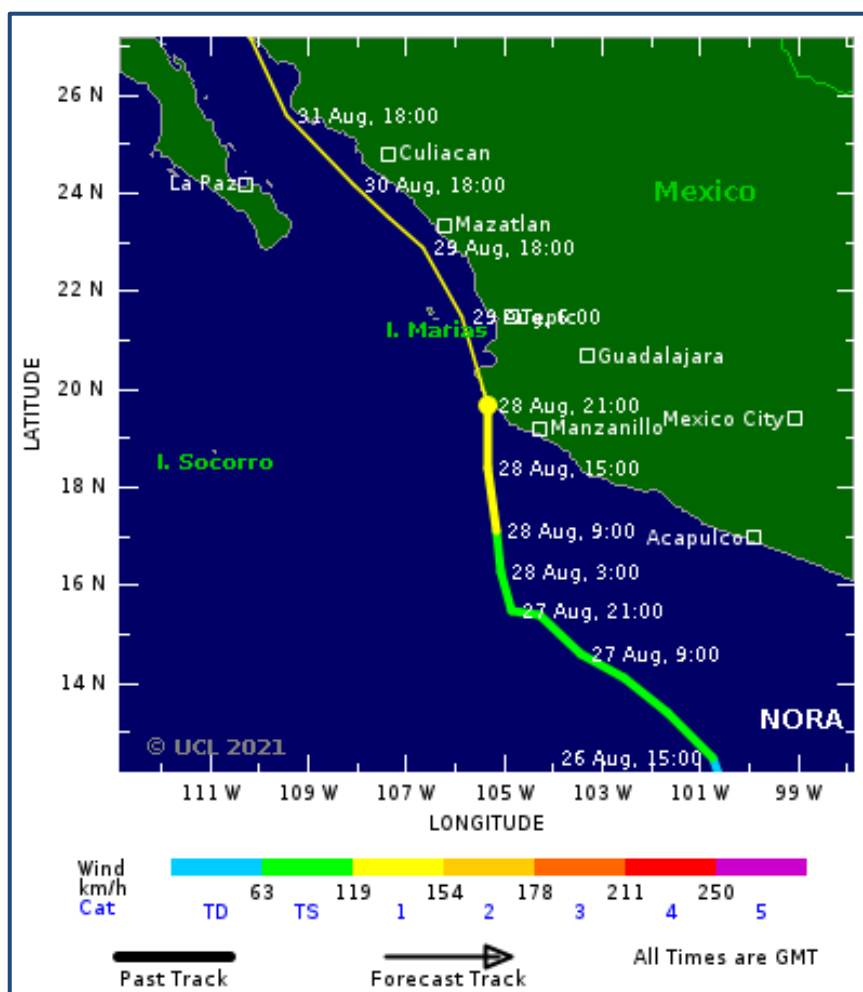
**Hurricane Ida crosses western Cuba on Friday**

There were long lines at gas stations, and some were reported to be running out of gas. Sunday will mark the 16th anniversary of Hurricane Katrina's landfall in Louisiana, which decimated New Orleans and other coastal communities in 2005. Last year there were 30 named Atlantic storms, including seven major hurricanes, a record high.

Experts have linked the climate crisis and global heating to the increased frequency of more powerful and destructive weather systems. The storm arrives following a summer of extreme weather events in the US, including severe wildfires on the west coast and deadly flooding in Tennessee earlier in the month.

### 10.14 Hurricane Nora struck Mexico at about 18:00 GMT on 28 August

**Source:** news.trust.org, 28 August, 2021



Hurricane Nora struck Mexico at about 18:00 GMT on 28 August. Data supplied by the US Navy and Air Force Joint Typhoon Warning Center suggest that the point of landfall was near 19.0 N, 105.4 W. Nora brought 1-minute maximum sustained winds to the region of around 129 km/h (80 mph). Wind gusts in the area may have been considerably higher.

According to the Saffir-Simpson damage scale the potential property damage and flooding from a storm of Nora's strength (category 1) at landfall includes: Storm surge generally 1.2-1.5 metres (4-5 feet) above normal. No real damage to building

structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Some coastal road flooding and minor pier damage. There is also the potential for flooding further inland due to heavy rain.

The information above is provided for guidance only and should not be used to make life or death decisions or decisions relating to property. Anyone in the region who is concerned for their personal safety or property should contact their official national weather agency or warning centre for advice.

### **10.15 Typhoon Conson causes power outages in eastern Philippines after landfall at Hernani**

**Source:** firstpost.com,7 September,2021

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Manila: A strong typhoon on Tuesday slammed into the eastern Philippines, bringing high winds that caused power outages in several provinces.

Typhoon Conson carried sustained winds of 120 km (74 miles) per hour with gusts of up to 150 kph (93 mph), first making landfall at the coastal town of Hernani in Eastern Samar province, before hitting the nearby Samar province early Tuesday, the state weather service said.

As of Tuesday morning, the eye of the typhoon was in the vicinity of Masbate province's Dimasalang town.

“We only have minor damage here, thank God,” Eastern Samar Governor Ben Evardone said in a text message.

He said work had been suspended in government offices.

Power systems operator National Grid Corporation of the Philippines said some transmission lines were affected. Power outages were reported in Eastern Samar, Samar and Leyte provinces.

Local officials reported some flooding in Tacloban City.

The weather bureau warned of destructive winds and heavy rainfall within 18 hours in portions of seven provinces including Quezon, Masbate, Albay and Samar, which are under typhoon level three warning out of a five-step system.

The metro region of Philippines' capital, Manila, is under level one warning, which means strong winds are expected within the next 36 hours.

Conson is forecast to weaken into a tropical storm Tuesday night or Wednesday morning.

About 20 typhoons and storms batter the Philippines each year, aside from seasonal monsoon rains. The country also lies in the so-called Pacific "Ring of Fire," a region prone to earthquakes and volcanic eruptions, making it one of the world's most disaster-prone nations.

## **10.16 Rapidly-intensifying Typhoon Chanthu headed for Taiwan and southern China**

**Source:** edition.cnn.com, 8 September, 2021

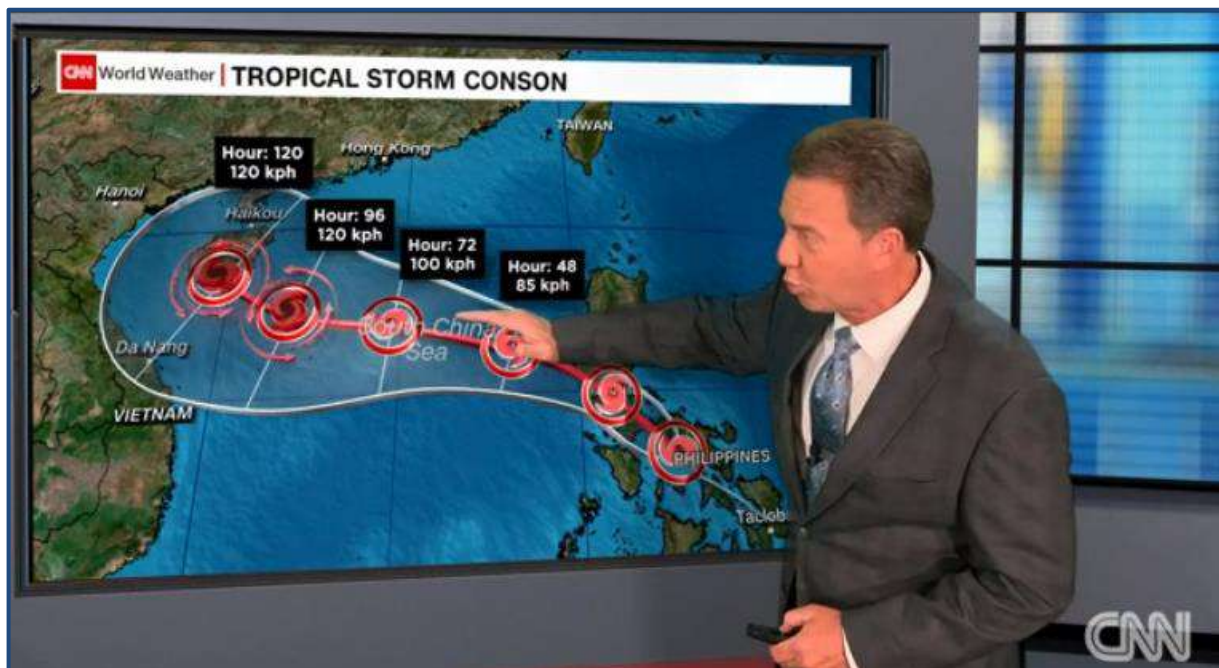
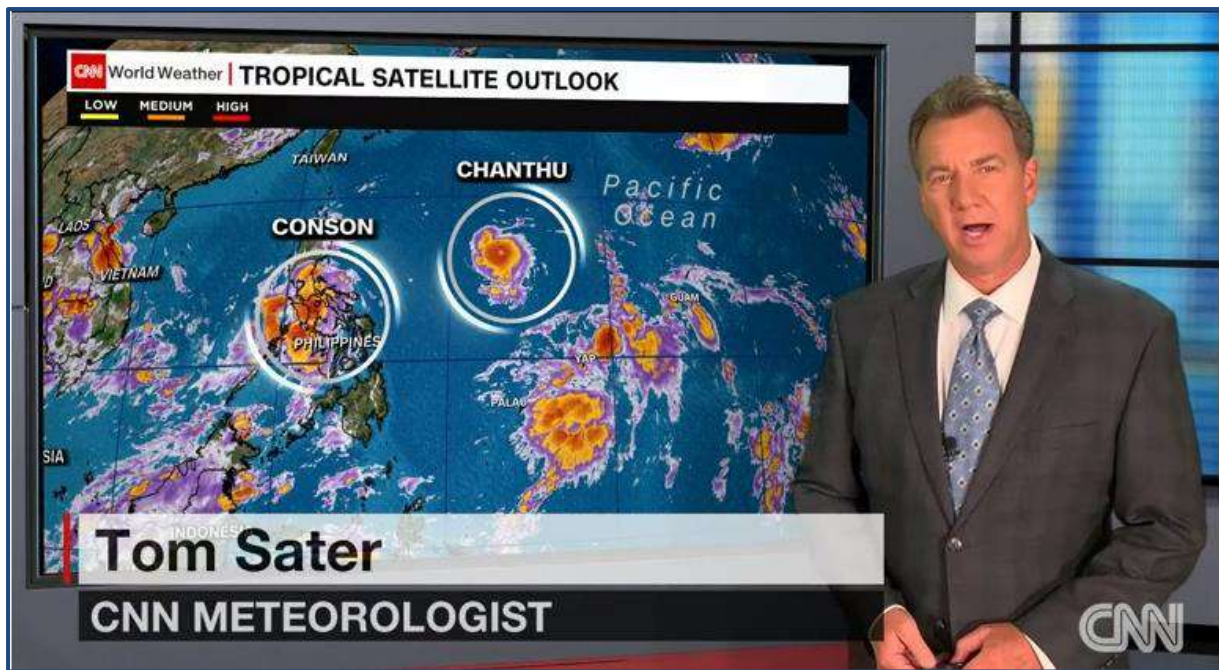
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Hong Kong (CNN)A typhoon headed toward Taiwan and the southern coast of China is rapidly gaining in speed and strength ahead of an expected landfall later this week.

Typhoon Chanthu has rapidly intensified in the past 36 hours from a tropical depression into a severe typhoon, according to the Joint Typhoon Warning Center, with maximum wind speeds of up to 233 kilometers per hour (145 miles per hour). It is likely Chanthu will expand into a super typhoon in the coming hours.

Given the trajectory of the storm, it is still unclear whether Chanthu will first pass over Taiwan before it slams into southern China or narrowly miss the island. Either way, at its current pace, the storm is estimated to make landfall on either Saturday or Sunday.





Typhoon Chanthu is just one of two dangerous weather systems which are barreling across the western Pacific. Severe Tropical Storm Conson made landfall in the Philippines overnight on Monday and will pass over the country before it heads north towards China's Hainan Island.

Conson is seeing wind speeds of up to 112 kph (70 mph). According to CNN Philippines, while warning signals were hoisted across the storm's path, no major damage has been reported so far.

Chanthu is likely to be the strongest storm to hit Taiwan or mainland China since Typhoon In-fa in July, which worsened already severe flooding across China's southeast.

In total, the economic losses from the typhoon and the flooding came to more than \$14 billion, according to Chinese state-run media.

## **11. Smog and Urban Air Pollution**

### **11.1 Poor air quality greets Phoenix on first day of 2021**

**Source:** azfamily.com, 1 January, 2021



PHOENIX (3TV/CBS 5) – If you woke up with a headache this morning, off-the-charts pollution in the Phoenix area is likely to blame. If you've been outside, you've undoubtedly seen the haze and

possibly even smelled the smoke from New Year's Eve fireworks.

The Arizona Department of Environmental Quality had already issued a High Pollution Advisory for the first day of 2021, but early Friday, it extended that warning to Saturday.

While bad air quality levels aren't unusual for this time of year, the Arizona Department of Environmental Quality says the weather played a huge factor.

"Now this year we certainly saw a lot of firework use. More fireplaces and our weather pattern is very stagnant," said Matt Pace, an air quality meteorologist. "So this will probably go down as one of the worst air quality days on record as far as New Years is for the Phoenix Valley."

By the end of Friday, ADEQ thinks the Phoenix area will be in the 250 to 300 range when it comes to the air quality index for smoke. That is a 24-hour average.

What can we all do to improve our air quality? Here is some advice from Pace. "Limit your firework use. Maybe not burn your fireplace every single day, especially on high pollution advisory days, and you can also switch over to gas," he said. "Don't drive your car on dirt roads. If you do have to drive on dirt roads, go slower."

ADEQ also has an app called "Air Arizona" that you can use to check the air forecast.

## **11.2 Urban air quality less improved by Covid lockdowns than first believed**

**Source:** eco-business.com, 15 January, 2021



**Women walk through smog in New Delhi, India. Fewer vehicles on the road caused increased ozone levels, since road traffic emissions normally remove ozone from the air**

Lockdowns during the first wave of Covid-19 had a much smaller impact on urban air quality than first expected, a study of 11 global cities, from Wuhan to New York, found on Wednesday.

As millions stayed home, concentrations in the air of nitrogen dioxide (NO<sub>2</sub>) - a key pollutant emitted by traffic, linked to respiratory infections and

cancer - fell by between 10 and 50 per cent, said the paper in the journal Science Advances.

But at the same time, concentrations of ozone (O<sub>3</sub>) - which can cause chest pain, harm lung tissue and worsen asthma — increased by 2 to 30 per cent in different cities, scientists found after accounting for the impact of weather and seasonal trends.

Road traffic emissions normally remove ozone from the air but with fewer vehicles on the road, there were fewer emissions and less ozone reduction, lead author Zongbo Shi of Britain's University of Birmingham told the Thomson Reuters Foundation.

"We found increases in ozone levels due to lockdown in all the cities studied," William Bloss, Professor of Atmospheric Sciences at the University of Birmingham, said in a statement.

"This is what we expect from the air chemistry, but this will counteract at least some of the health benefit from NO<sub>2</sub> reductions."

The researchers studied pollution levels in 11 cities that had extensive lockdowns - Beijing, Wuhan, Milan, Rome, Madrid, London, Paris, Berlin, New York, Los Angeles and New Delhi.

Previous studies found much more dramatic falls in NO<sub>2</sub>, including a paper by the Chinese Academy of Science which said Wuhan, where Covid-19 was first identified, saw a 93 per cent drop in NO<sub>2</sub> at the height of the coronavirus outbreak.

The Birmingham scientists said it was important not to simply compare air quality before and after restrictions began or levels in the same periods in previous years.

Instead, they used machine learning to strip out the impact of weather on air quality before analysing data from 2015 to May 2020, and took into account how cities with clean air policy actions would see emission reductions over time.

The third pollutant studied was PM<sub>2.5</sub>, or particulate matter like soot and smoke, which is emitted by cars and industry and can lodge in the lungs and enter the bloodstream, causing fatal lung and heart diseases.

Concentrations of PM<sub>2.5</sub> decreased in all cities except London and Paris but the declines were nowhere near enough to meet WHO guidelines, the paper said.



### 11.3 Dhaka is world's most polluted city

**Source:** dhakatribune.com,26 February,2021



#### **A glimpse of air pollution in Dhaka**

According to the World Health Organization (WHO), air pollution kills an estimated seven million people worldwide every year

The densely populated capital of Bangladesh continues to dominate the list of world cities with the worst air quality.

On Friday, Dhaka occupied the first position in the list. The city of Beijing in China occupied the second place. The third and fourth spots were grabbed by Kathmandu of Nepal and Delhi of India, respectively.

Dhaka's air quality index (AQI) was recorded at 237 around 2 am, which is considered 'very unhealthy'.

An AQI between 201 and 300 is considered "poor," while a reading of 301 to 400 is said to be "hazardous," posing serious health risks to city residents.

AQI, an index for reporting daily air quality, is used by government agencies to inform people how clean or polluted the air of a certain city is, and what associated health effects might be a concern for them.



In Bangladesh, the overall AQI is based on five criteria pollutants – Particulate Matter (PM10 and PM2.5), NO2, CO, SO2, and Ozone (O3).

Bangladesh has a subtropical monsoon climate characterised by wide seasonal variations in rainfall, high temperatures and humidity. Generally, Dhaka's air starts getting fresh when monsoon rains begin in mid-June. The air remains mostly acceptable from June to October.

In February last year, Bangladesh's Environment, Forests and Climate Change Minister Md Shahab Uddin admitted that air pollution levels in the capital "has reached an extreme level."

"This is mainly due to uncontrolled discharge of dust from construction projects, smoke from vehicles and brick kilns," he told UNB.

"Brick kilns are responsible for 58% of air pollution in the capital. There are plans to shut down (traditional) kilns in operation. We plan to stop burning bricks at all kilns by 2025 and use block bricks to construct buildings under government projects," he said then.

Besides, on January 31, the High Court directed the authorities concerned to shut down all illegal brick kilns by February 18.

Air pollution consistently ranks among the top risk factors for death and disability worldwide. Breathing polluted air has long been recognized as increasing a person's chances of developing heart disease, chronic respiratory diseases, lung infections, and cancer, according to several studies.

As per the World Health Organization (WHO), air pollution kills an estimated seven million people worldwide every year, largely as a result of increased mortality from stroke, heart disease, chronic obstructive pulmonary disease, lung cancer and acute respiratory infections.

Over 80 percent living in urban areas, which monitor air pollution, are exposed to air quality levels that exceed WHO guideline limits, with low- and middle-income countries most at risk.

#### **11.4 Smog to stay for some more days in Kathmandu Valley**

**Source:** myrepublica.nagariknetwork.com, 28 March, 2021

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KATHMANDU, March 28: The smog blanketing the Kathmandu Valley since Friday is to stay for some more days. The Department of Hydrology and Meteorology has said that the air pollution caused by wildfire in most of the

districts, long drought and lack of strong wind are the reasons behind the smog.



The polluted air has badly declined visibility in the Valley. However, the atmosphere which is currently stable will improve in two to three days, according to meteorologist Bibhuti Pokhrel. She shared the information that most of the districts in the country are facing the problem of wildfire and no rainfall for the past some time. The improvement in current whether needs either wind or rainfall, she stressed.

The people have felt eyesore due to the air pollution. The Department has requested everyone not to leave home and compulsorily use masks and maintain further alertness in case of leaving home to stay away from the effects of air pollution.

Currently, there is a minor effect of the westerly wind and local wind, which will cause light rain with thunder and lightning in few places of the hilly region in the country today, the Department forecast.

### **11.5 Thick smog shrouds valley yet again**

**Source:** thehimalayantimes.com, 6 April, 2021

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Air quality of Kathmandu Valley deteriorated yet again today, as a thick layer of smog blanketed the valley. Air pollution in the valley had come down after rainfall on Wednesday. The hourly data of air pollution at pollution measuring units inside the valley show that pollution is at its worst between 7:00am and 10:00am. The fine particulate matter (PM 2.5), considered the most hazardous pollutant, was 305 microgram per cubic metre at 10:00am at the US Embassy in Maharajgunj, Bhaisepati, and Jhamsikhel. At 7:00am, PM 2.5 was 260  $\mu\text{g}/\text{m}^3$ , 273  $\mu\text{g}/\text{m}^3$ , and 285  $\mu\text{g}/\text{m}^3$  at the three places,

respectively. In Bhaktapur, PM 2.5 was 299  $\mu\text{g}/\text{m}^3$  at 7:00am, not changing much at 10:00am; at the US Embassy, Phara Durbar, PM 2.5 was 330  $\mu\text{g}/\text{m}^3$  at 7:00am. Air pollution came down slightly between 10:00am and 3:00pm. The pollution, however, increased after 3:00pm.



**Haze engulfs Kathmandu valley yet again as the air pollution fluctuates between unhealthy level and hazardous level, as seen in this picture taken on Monday, April 5, 2021**

Environmentalists say that lower temperature is one of the major reasons for increased air pollution in the morning. Indu Bikram Joshi, deputy director general of Department of Environment, said smog blocked the sunlight, bringing the temperature down. "Decreased temperature traps cold air, with small pollutants on the lower level.

"He said after 10:00am, the temperature starts increasing and pollutants ascend to higher levels. Pollution is unlikely to come down unless there is a strong westerly wind or heavy rainfall inside the valley, Environment Engineer Riya Shrestha told THT. Other reasons for the hazardous haze shrouding the valley are wildfires raging around the valley for the past few weeks, vehicular and industrial emission, and burning of waste materials.

To worsen the situation, air movement inside the valley has remained stagnant, one of the reasons for dismal rainfall in the last several months. Health authorities have advised people to stay at home and avoid morning exercise and other outdoor activities. Anup Bastola, consultant tropical medicine, Sukraraj Tropical and Infectious Disease Hospital, said, "Exercising in the morning can be harmful, as people tend to inhale more

unhealthy air while exercising. " He said the number of people with respiratory ailments, allergies, ENT problems, and breathing difficulties have increased in the past few days. "Air pollution can be damaging for children, elderly, and ailing people."

## **11.6 San Bernardino, Riverside, Los Angeles counties rank as smoggiest in U.S.**

**Source:** ocregister.com,21 April,2021

The five-county Los Angeles region is the smoggiest metro area in the country for the 21st time in the 22 years that the American Lung Association has been issuing the rankings, according to the "State of the Air 2021" report released Tuesday, April 20, by the group.



### **The five-county Los Angeles metro area ranked as the nation's smoggiest for the 20th time in the last 21 annual State of the Air reports from the American Lung Association**

In the county-by-county breakdown, San Bernardino, Riverside and Los Angeles counties rank first, second and third as the nation's smoggiest counties. Orange County, listed 25th, also received a failing grade. Ventura County, included in the five-county region, was not among the 25 worst, but also got an "F." The report compiled data from a three-year period, 2017 to 2019.

The region's poor showing came despite improvements from the 2020 report and after decades of progress in a state with some of the country's most aggressive air-quality laws and initiatives. Climate change and related repercussions, including increases in wildfires and heat, are contributing to ongoing air quality challenges, while motor vehicle traffic continues to be a primary factor.

Six other metro areas in the state were among the 10 worst in the country for smog, and six, including Los Angeles, were among the 10 worst for soot, also known as particle pollution.

"California's leading clean air policies have driven significant improvements, but more must be done to ensure that all communities experience the benefits of healthy air," said Will Barrett, director of clean air advocacy for the American Lung Association.

Barrett called on state lawmakers to invest \$1 billion in zero-emission vehicle infrastructure and initiatives to help lower income residents get into zero-emission cars. He also urged the California Air Resources Board to establish zero-emission rules for commercial trucks.

"There's no time for delay," he said.

Nationwide, while there was improvement in air quality, significant work still needs to be done to reduce both smog — also known as ozone — and particle pollution. Since the Clean Air Act was passed in 1970, emissions of pollutants have fallen by 77%, but millions of Americans remain at risk.

"More than 40% of Americans — more than 135 million people — are living in places with unhealthy levels of ozone or particle pollution," the report says. "The burden of living with unhealthy air is not shared equally. People of color are more than three times more likely to be breathing the most polluted air than (are) white people."

### **Health repercussions**

Both smog and soot can contribute to asthma and other lung diseases, as well as heart disease, reproductive and developmental issues, and respiratory infections. But those two air pollutants, considered the most harmful, are a particular threat to those who already have lung and heart problems, to the elderly and to children.

"Simple activities like walking to school or playing outside after school are turned into health threats," said Southern California pediatrician Afif El-Hasan at an American Lung Association teleconference Tuesday. "This is a public health threat that's out of their control."



Jack Broadbent, head of the Bay Area Air Quality Management District, told reporters at the teleconference that he was encouraged by President Joe Biden's priorities concerning emissions and air quality.

The report, meanwhile, called for a host of specific federal actions, including a reduction of emissions — and not just carbon-credit trading — in underserved communities and more funding of state and local air quality monitoring.

The American Lung Association also called on the U.S. EPA to set stronger limits on ozone and particle pollution, limits on methane emissions, and “a strong, long-term plan to reduce vehicle emissions.”

### **11.7 Why the air quality in Philly might be worse than we know**

**Source:** [whyy.org](http://whyy.org), 2 May, 2021



**The Delaware City Refinery in New Castle, Del. A new report on air pollution from the Lung Association focuses on the four-state, 16-county Philadelphia-Reading-Camden-PA-NJ-DE-MD metro area**

A recent report by the American Lung Association ranked the Philadelphia-Reading-Camden metro area among the top 25 most polluted in the United

States in terms of two of the most common, and dangerous, ambient air pollutants measured nationally. But experts say the ranking doesn't tell the whole story of how air quality affects those in the region.

The Lung Association's 22nd annual "State of the Air" report, released in mid-April, is based on data gathered from 2017 to 2019 and focuses on two of the six major air pollutants originally identified by the Clean Air Act of 1970. The four-state, 16-county Philadelphia metro area ranked as the 17th most polluted in the nation for its year-round average levels of fine particle pollution (sometimes called soot pollution) and as the 21st most polluted for days with high levels of ozone smog.

"The pollutants are very serious in terms of what they cause by way of health effects," said Kevin Stewart, director of environmental health with the Lung Association. "There are large population groups at risk, certainly children, infants, elderly folks. And then there are other population groups, people who live in poverty. People who have a history of smoking and also persons of color are given some particular emphasis in this year's report."

Both pollutants are the result of burning carbon-based fossil fuels. Fine particle pollution is a complex mixture of particles commonly derived from car exhaust, coal power plants, wildfires, construction, and agriculture that react with the atmosphere. Short-term spikes in fine particle pollution can be deadly, according to the Lung Association, as the pollutant has the potential to penetrate the deepest parts of the lungs and the bloodstream. After recent improvements, this year's report saw the metro area score significantly worse in the average number of days with high levels of fine particulate pollution than the last three years.

"Even though [the levels] meet the EPA standard, it's still not something that the Lung Association recognizes as perfectly healthy for people. And so that's a concern," Stewart said.

Ozone smog also poses a notable risk to Philadelphians, said Stewart. The pollutant is produced in the air when harmful human-made vapors, including volatile organic compounds and unburned fuels, mix with oxides of nitrogen. Exposure to high levels of ozone pollution can cause a burning effect within the lungs and has been linked to a variety of harmful health outcomes for those especially vulnerable.

"Philadelphia County was the worst in the area for ozone smog and got an F grade. Even though it did improve compared to last year's measurement, an F is still an F," Stewart said.

The report takes on new meaning in light of health disparities highlighted by the pandemic — the coronavirus imperils those with compromised respiratory systems — and a new study that shows a link between ozone and fine particulate matter pollution and childhood asthma in Philadelphia between 2011 and 2014.

“Asthma seems to be a little more common in Black communities, underserved communities for a number of the social determinants health reasons. But that also seems to mirror where a lot of the data from our ... report shows the air quality to be more at risk as well,” said Albert Rizzo, the Lung Association’s chief medical officer. “We know that bad ozone days and we know high particulate matter causes increased flare-ups in patients with asthma, [the need for] emergency room hospitalizations, medications, and other lung diseases like COPD.”

Yet Jane Clougherty, an associate professor at Drexel University’s Department of Environmental and Occupational Health, said that while the new report is cause for concern, it’s what remains unmeasured in the area that worries her most.

“There was a great deal of attention to ambient fine particulate matter and ozone nationally brought from an EPA regulatory or quality standpoint, as well as the larger research on air quality and children’s health, and air quality and asthma, in the Philly region,” she said. “However, those are not necessarily the most important pollutants that we should be focusing on.”

Clougherty said the City of Philadelphia is not doing enough to measure the presence of cancer-causing chemicals like volatile organic compounds (VOCs) in the air throughout the metro area, and that despite more recent attempts to study air pollution in detail, the city’s Department of Public Health Air Management Services (AMS) has not added crucial markers and refinery indicators specific to industry in the area to its list of pollutants.

“We have a confluence of multiple refineries in our region, a major airport, a major ports shipping complex, as well as the I-95 corridor. So we have a great complexity of very large air pollution sources, clustered in one part of our city,” Clougherty said. “And that really has not been appropriately disentangled. Because in part, we’ve been thinking about pollutants that are nationally relevant, not really thinking about the things that are relevant here in Philly. And that’s really a shift we need to make.”

But for that shift to happen, Clougherty said, more data must be gathered to understand the extent of the problem. Following the Philadelphia Energy Solutions refinery explosion and shutdown in 2019, the city undersampled

air quality in especially vulnerable neighborhoods, leaving academics with more questions than answers, she said.

“The monitoring that has been done for VOCs is quite sporadic,” she said. “There is one VOC monitor that is maintained at the Ritner [Street] site by AMS. But that is technically not downwind of the PES refinery, it’s actually just a bit north of the refinery. And therefore it conveniently missed the plume of emissions on the day when the ... refinery exploded in June of 2019. The data is also quite sparse at that site.”

In response, Philadelphia Health Department spokesperson James Garrow said in an email Thursday that the monitoring site at 24th and Ritner streets “was consciously placed in the community that is most at-risk of being exposed to emissions from that site. Given that PES maintained a series of fenceline monitors downwind of the refinery site, and NJDEP [New Jersey Department of Environmental Protection] maintains air monitors similarly downwind, both of whom AMS works closely with to track emissions and plumes, it just makes sense to not place a duplicate monitoring station downwind. A monitor in the community, however, provides actionable information about how any emissions actually affect the public.”

Rethinking how to measure Philadelphia’s air pollution problem is an important first step toward centering environmental justice as communities redevelop, Clougherty said.

“In Philadelphia, just like in most American cities, land that is most proximate to our industrial areas and our highways tends to be devalued, tends to have a lower-income population in that area,” Clougherty said. “So there’s no question that air pollution and air pollution sources are a huge aspect of health disparities and environmental justice. That’s one of the reasons why it’s been so important for community input and a sense of ownership in what’s happening in and around their neighborhood.”

## **11.8 Manila warns residents smog may worsen underlying conditions**

**Source:** pna.gov.ph, 29 June, 2021

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MANILA – The prevailing thick smog observed in Manila on Tuesday is risky, especially to the elderly, children, and those with underlying conditions.

The Manila Department of Public Service (DPS) said based on their air quality monitoring, the smog was primarily caused by pollution from mobile vehicles and other industrial sources.



**HAZY. High-rise buildings are barely visible in the Quezon City area on Tuesday (June 29, 2021). The Philippine Institute of Volcanology and Seismology said the haze is not coming from the volcanic smog over the Taal Volcano's caldera but due to other activities like vehicle movements**

The DPS also refuted the rumor that the haze was caused by the unstable condition of Taal Volcano.

DPS Director Kenneth Amurao said an increasing concentration of Particulate Matter (PM) 2.5 has been recorded in the city since June 25.

DPS air quality monitoring report from 10 a.m. on Monday until 9 a.m. Tuesday showed

that the Air Quality Index City was observed to be unhealthy for sensitive groups, Amurao said.

PM2.5 is described as “fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller”, according to experts.

"Low wind speeds have been observed in the city since Sunday, which also contributes to lower dispersion of particulates in the atmosphere," the DPS report read.

The DPS warned that people with lung and heart disease, older adults, and children are at greater risk from air pollution exposure.

Amurao advised wearing surgical masks, like N95 or KF94, or any tight-fitting masks when going outdoors.

Manila has five air quality sensors installed at the Freedom Triangle roadside beside the City Hall, Mehan Garden, Rizal Park, Barangay 128 roadside in Tondo, and Aurora Boulevard intersection in Sta. Cruz.



## **11.9 High levels of wildfire smoke in Toronto, special air quality statement issued**

**Source:** [toronto.ctvnews.ca](https://toronto.ctvnews.ca), 25 July, 2021



**A hazy sky is seen in Toronto on Sunday, July 25, 2021.  
Environment Canada has issued a special air quality statement for  
the city due to forest fire smoke**

TORONTO -- Environment Canada issued a special air quality statement Sunday for various regions across Ontario, including the Greater Toronto Area.

The statement was issued due to high levels of wildfire smoke in the province, which can cause increased air pollution and reduced visibility.

“Smoke plumes from active forest fires in northwestern Ontario might affect portions of southern Ontario this afternoon. Particulate matter combining with ground level ozone may deteriorate the air quality,” a release on the statement issued reads.

The agency warns residents who are exposed to wildfire smoke to take extra precautions, adding that wildfire smoke is a “constantly-changing mixture of particles and gases which includes many chemicals that can be harmful to your health,” especially to children, seniors and those with cardiovascular or lung disease.

Look out for symptoms such as increased coughing, throat irritation, headaches or shortness of breath.

Conditions may persist into Monday, according to Environment Canada.

This week, hundreds of evacuees from northwestern Ontario First Nations were forced to call a Mississauga hotel their temporary home after wildfires threatened their communities.

According to Ontario's Ministry of Natural Resources and Forestry, as of July 24, there were over 150 active fires burning in the province.

### **11.10 Pakistan: Schools, offices closed three days a week in Lahore as smog worsens**

**Source:** gulfnews.com, 23 November, 2021



**Smog envelops the area of Lahore on November 22, 2021. People of Lahore and adjacent area are suffering from respiratory problems because of poor air quality related to thick smog hanging over the region**

Islamabad: Schools and private workplaces will remain shut three days a week in Lahore as the city battles the winter smog.

The Punjab government has announced the closure of private offices and educational institutions in Lahore on Mondays in addition to Saturday and Sunday from November 27 till January 15, 2022, in an attempt to curb the city's smog problem.

The private offices have been asked to reduce staff by allowing 50 per cent of employees to work from home. The directive, issued by Punjab Relief Commissioner Babar Hayat Tarar, aims to act "as a preventive and speedy remedy" to ensure public safety and save lives during the smog season.

### **Lahore dealing with chronic smog**

The three-day weekend measure was announced after Lahore continually topped the list of world cities with the most polluted air. The air quality levels (AQI) in the city had remained hazardous and unhealthy for the whole month of November, reaching as high as 341, according to the IQ Air monitoring platform. AQI values below 100 are considered satisfactory and anything above 100 is unhealthy.

### **How authorities are tackling smog issue**

Lahore faces extremely bad air in winter due to crop stubble burning, emissions from transport, coal-fired plants and other industrial emissions.

Punjab Chief Minister Sardar Usman Buzdar has announced several measures to reduce traffic, industrial and other emissions, eliminate waste burning, and implement stringent dust control measures especially. The authorities have also accelerated the procurement of electric buses.

All industrial units have been directed to install scrubbers for emission control and cameras for monitoring by December 4 for real-time industrial emission monitoring. To reduce urban pollution from road traffic, petroleum products manufacturers have been to shift to cleaner Euro-5 fuel. The Punjab government has also informed its departments to reduce the use of official cars by 50 per cent till January 15, 2022.

### **Smog - a public health crisis**

Smog, a mix of smoke and fog, is a specific type of air pollution. It reduces visibility and can cause serious health problems starting from irritation to human eyes, nose and lungs.

Air pollution is now one of the biggest health and environmental threats, which kills at least 7 million people prematurely each year, according to World Health Organization (WHO).

## **12. Wildfire**

### **12.1 Huge wildfire raging at Pipiwai, 130ha burnt so far**

**Source:** nzherald.co.nz, 29 January, 2021



#### **The fire started in young pines near Pipiwai Rd**

Firefighters are battling to control a massive 130ha wildfire in pine forest south of Kawakawa before forecast high winds hit later today.

The blaze started about 3.30pm on Thursday on Pipiwai Rd, between James Rd and Lovatt Rd, about midway between Whangārei and Kaikohe.

Seven helicopters got to work at first light this morning using monsoon buckets with 70 forestry contractors from around the North helping firefighters on the ground.

A huge column of smoke can be seen from many kilometres away.

Deputy principal rural fire officer Wayne Martin said the fire, in one- and two-year-old pine trees, was not yet contained. Strong winds were forecast later today.

Firefighters advised families in three homes on Pipiwai Rd to evacuate just before 8pm on Thursday.

Evacuees were directed to Matawaia Marae, north of the fire, and Tau Henare Marae to the south. The marae were also providing meals for weary firefighters.

## **12.2 56 homes lost, more threatened in Australian wildfire**

**Source:** timesofindia.indiatimes.com, 2 February, 2021



**In this photo provided by Department of Fire and Emergency Services, fire burns on a hill at Wooroloo, near Perth, Australia, Monday, Feb. 1, 2021**

PERTH, Australia: An out-of-control wildfire burning northeast of the Australian west coast city of Perth has destroyed at least 56 homes and was threatening more Tuesday, with many residents across the region told it is too late to leave.

The 7,000-hectare (17,000-acre) blaze, which has a 80-kilometer (50-mile) perimeter, began on Monday and raged through the night near the town of Wooroloo, with the shires of Mundaring, Chittering, Northam, and the city of Swan affected.



The losses were expected to grow as teams continued their damage assessments, Western Australia state Department of Fire and Emergency Services Commissioner Darren Klemm said.

A firefighter was treated for smoke inhalation and another received a superficial burn to an ear, Deputy Commissioner Craig Waters said. No other injuries were reported.

The fire doubled in size overnight and burned through 7,366 hectares (18,202 acres) of farm and woodland, Waters said.

“Strong winds are hampering us getting in and containing the fire and bringing it under control,” he said.

State Premier Mark McGowan said 80% of all properties at Tilden Park near Gidgegannup on Perth's northeast rural fringe have been lost.

McGowan said a large aerial tanker was flying from the Australian east coast to help fight the blaze.

“This is an extremely dangerous fire and a serious situation. Weather conditions are extremely volatile,” McGowan said.

“Please do everything you can to keep you and your family safe and look after each other,” he added.

People in a 25-kilometer (16-mile) stretch west from Wooroloo to the Walyunga National Park northeast of Perth were told Tuesday it had become too dangerous to leave their homes.

“You must shelter before the fire arrives, as the extreme heat will kill you well before the flames reach you,” the latest warning said.

Roads out of semi-rural suburb The Vines on Perth's northern outskirts were bumper-to-bumper with traffic, making some people choose to stay.

Melissa Stahl, 49, heeded a text telling her to evacuate.

“I could smell the fire and went out the back and the whole yard was filled with smoke,” she said. “We grabbed bedding, photos, the two kids and the dog and got out of there.”

A warning to other threatened areas told people to leave if they are not prepared to fight the blaze. The bushfire is unpredictable and weather conditions are rapidly changing, the warning said, urging people to stay vigilant.

The cause of the blaze was unknown.

Department of Fire and Emergency Services Superintendent Peter Sutton said about 250 firefighters had been battling the erratic fire.

“It has made it very hard, near on impossible ... to suppress this fire,” Sutton said.

Wildfires are common during the current South Hemisphere summer. However the season has been mild on Australia's southeast coast, which was devastated by massive fires last summer.

### **12.3 South Dakota governor declares a state of emergency due to several wildfires**

**Source:** edition.cnn.com,31 March,2021



#### **The Schroeder Fire has charred about 2,100 acres and remains zero percent contained, according to officials**

(CNN)South Dakota Governor Kristi Noem declared a state of emergency Tuesday following fires that have forced hundreds to evacuate and closed Mount Rushmore.

The state of emergency will run through June 1 due to "severe drought and dangerous fire conditions," a news release from the governor's office said.

"This executive order is in response to the numerous fire incidents occurring throughout the state. The order will allow the state to provide greater

assistance to the response efforts of local and volunteer firefighters," the release said.

The Schroeder Fire, burning in Pennington County, just a mile west of Rapid City limits, has forced the evacuation of 400 to 500 homes since it sparked on Monday morning, Rob Powell, the incident commander, said at a news conference.

The blaze has so far charred about 2,100 acres, Powell said Tuesday afternoon. Officials hope to have it 50% contained by the end of the day, he said.

At least one home and two pole barns have been destroyed in the fire, the Pennington County Sheriff's Office said on Facebook.

The fire started on "private property," according to Noem, but officials say an investigation is ongoing into the cause and origins of the blaze.

The dangerous weather conditions have made it a harder battle for the more than 200 firefighters on the scene.

"We are at record-dry conditions along with high winds playing a major factor in this fight," Jay Esperance, the division director for South Dakota Wildland Fire, said in a statement on Monday.

No injuries or deaths have been reported.

### **Fires forced closure of Mount Rushmore**

Meanwhile, Noem also provided updates on two fires burning near the Mount Rushmore National Memorial, which is closed because of the threat.

This area is about 20 miles southwest of Rapid City.

The two fires in the area have been dubbed the 244 Fire and the Keystone Fire.

The 244 Fire is estimated to be around 90 acres, according to the last update Tuesday by the Great Plains Fire Information website. The blaze is about 1.5 miles southwest of Keystone, according to the site.

The Keystone Fire was downsized Monday evening from 30 acres to 15 acres, according to the site.

"Fire officials request that people from the public to please stay away from the area and allow firefighters to do their work," it said.

No businesses are being threatened by the flames at this time, the governor said during the news conference.

"I do want to remind everybody that this is an incredibly fluid situation," she said. "That these winds are a major factor and that as they shift and change and we get those gusts, that's when the can jump and we're going to have to stay pretty mobile."

## **12.4 Wisconsin in state of emergency for wildfire risks; over 1,400 acres already burned**

**Source:** [nbcnews.com](https://www.nbcnews.com), 6 April, 2021



### **Wisconsin fire crews fight a wildfire in Menomonee Falls that burned nearly 450 acres of marshland Friday and has since been contained**

Wisconsin was in a state of emergency Monday over increased wildfire risk, with more than 300 blazes having already been reported this year.

More than 1,400 acres have been burned in the state, and experts expect a longer-than-usual fire season because of the early melting of snow, Gov. Tony Evers said. Incoming weather conditions, such as gusty winds and low humidity levels, are also more conducive to wildfire spread.

"With nearly the entire state experiencing high or very high fire risk, protecting Wisconsinites from the destructive dangers of wildfires is a top priority," Evers said.

Spring wildfire season in Wisconsin typically runs through the end of May, the governor's office said.

The executive order, which Evers signed Monday, allows the National Guard to mobilize with the state's Department of Natural Resources, which handles wildfire response. The department said in a release Saturday that the majority of counties are at very high risk of fire danger.

Annual burning permits have been suspended, the department said Saturday.

"To help us keep Wisconsinites safe, the DNR is asking you to avoid all outdoor burning including limiting the use of campfires and making sure to extinguish and dispose of cigarettes properly," the release said. "Outdoor enthusiasts should also use caution with off-road vehicles or equipment that can create a spark and start a fire."

A state Department of Natural Resources spokesperson did not immediately respond to a request for comment.

Experts said last week that large parts of the country are preparing for another potentially dangerous wildfire season.

Last year, millions of acres burned in a record wildfire season that was focused primarily in the western half of the country, in states such as California, Washington and Oregon. But this year, blazes have already burned in the Upper Plains, Rockies, Great Lakes and Southwest regions.

Nearly 1,800 firefighters had mobilized to battle at least 19 blazes across those regions Friday, Stanton Florea, a spokesman for the National Interagency Fire Center, said previously.

While fire experts are not panicking yet, they are preparing for the worst, said Carrie Bilbao, a spokeswoman with the Bureau of Land Management who also works with the National Interagency Fire Center.

"Fire season can be at any time," Bilbao said. "We just don't really have those wet seasons consistently anymore."



## **12.5 Multiple Homes Destroyed in Arizona Wildfire; Evacuation Orders Lifted**

**Source:** weather.com, 29 May, 2021



**A person surveys the remains of a charred home from the Spur Fire on Friday, May 28, 2021, the day after the blaze broke out and destroyed several homes and other structures in Bagdad, Ariz**

A fast-moving wildfire destroyed multiple homes in the small town of Bagdad, Arizona, Thursday.

The Yavapai County Sheriff's Office said in a social media post late Thursday night that as many as 30 homes may have burned. The Arizona Department of Forestry and Fire Management later said 13 primary structures had burned, plus 10 secondary buildings.

Deputy Scott Reed, a spokesperson for the sheriff's office, told weather.com in a phone call Friday morning that damage assessments were still underway and it wasn't yet clear exactly how many homes had burned.

"We just don't know that now," Reed said.

"It did spread into homes and there were homes lost to the fire. An evacuation was ordered before that, though, and as of now there's no reports of any deaths involved."

He said the entire town of about 2,000 people was told to leave, including residents of some 500 homes. As of Saturday morning, all evacuation orders had been lifted.

The fire broke out late Thursday afternoon close to a residential area where there's a baseball field and then some dry brush in an open field, Reed added.

At one point, the town's 911 lines were down because of the fire.

The cause of the blaze was under investigation, but initial information indicated that it may have been started by a road crew, the sheriff's office said.

Bagdad is a copper mining town about 125 miles north of Phoenix and 60 miles west of Prescott.

The blaze, dubbed the Spur Fire, had burned about .25 square mile of land and was 25% contained as of late Thursday night, according to the Department of Forestry and Fire Management.

Forward progress on the fire had been stopped, but evacuation orders were still in place. The agency reported at least 13 primary structures had been destroyed, as well as 10 other buildings.

Much of the Southwest, including all of Arizona, is considered at above average risk for wildfires through June, according to the National Weather Service. Much of the region is also in extreme or exceptional drought conditions, the two highest categories, according to the U.S. Drought Monitor.

## **12.6 Wildfire in Mountains Casts Plume of Smoke Over Las Vegas**

**Source:** usnews.com, 10 June, 2021

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LAS VEGAS (AP) — Fire officials said Thursday that crews were battling a wildfire that forced a precautionary evacuation of a Boy Scout camp and cast a huge plume of smoke into the evening sky above Potosi Mountain west of Las Vegas.

The fire was reported about 1 p.m. and quickly grew to more than 200 acres (81 hectares) in the area of Sandy Valley Road and State Route 160, the main highway between Las Vegas and rural Pahrump, Assistant Clark County Fire Chief Scott Carnahan said.

No structures were immediately in danger and no injuries were reported.

Carnahan said the cause of the fire was not immediately known.

Clark County, Mountain Springs and federal Bureau of Land Management and U.S. Forest Service firefighters were involved in the effort to contain flames in a wooded area about 30 miles from downtown Las Vegas.

The National Weather Service has predicted the weekend will be exceptionally hot and dry. Forecasters issued an excessive heat warning for temperatures above 100 degrees (38 Celsius) in the Las Vegas area on Saturday and 110 degrees (43.33 Celsius) by Monday. Humidity is in the single-digits.

## **12.7 Death toll in wildfires that hit southern Turkey rises to 4**

**Source:** indianexpress.com,31 July,2021

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The death toll in a string of wildfires raging in southern Turkey rose to four, officials said Friday, as fire crews continued to battle blazes that burned down homes and forced people to evacuate settlements and beach resorts.

Firefighters were still tackling wildfires in 14 locations in six provinces in Turkey's Mediterranean and southern Aegean region, President Recep Tayyip Erdogan told reporters. A total of 57 others wildfires that broke out amid strong winds and scorching heat have been brought under control since Wednesday, he said.

The worst fires were in the Manavgat and Akseki regions, in Antalya province, where strong winds pushed the fire toward settlements on Wednesday. An 82-year-old man and a married couple died, more than 50 people were hospitalized and dozens of homes were incinerated. More than 25 neighborhoods or villages were evacuated.

Meanwhile, a 25-year-old volunteer died in another fire near the resort of Marmaris, about 320 kilometers (200 miles) west of Antalya late on Thursday, raising the death toll in the fires to four. State-run Anadolu Agency said the man was taking drinking water to firefighters, but was involved in a motorcycle crash and perished in the fire.

The mountainside fire in Marmaris briefly threatened holiday homes and hotels on Thursday while guests at a luxury hotel in the Aegean beach resort of Guvercinlik, near the town of Bodrum, were evacuated in boats, reports said.

Azerbaijan announced it would send 500 emergency response personnel, helicopters and other equipment to help Turkey, a close ally, battle the blazes. Erdogan said Azerbaijan would also provide an amphibious firefighting aircraft, in addition to planes sent from Russia and Ukraine. Neighboring Greece also offered help.

Authorities on Thursday launched investigations into the fires. Fahrettin Altun, a top aide to Erdogan, said “those responsible will have to account for the attacks against nature and forests.”

The mayor for Marmaris said he couldn’t rule out “sabotage” as a cause for the fire there.

Erdogan said Friday the country’s Interior Ministry and intelligence services were “engaged in an intense effort” to shed light on the fires.

## **12.8 Thousands Are Racing To Flee A Lake Tahoe Resort City As A Huge Wildfire Spreads**

**Source:** [npr.org](https://www.npr.org), 30 August, 2021

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SOUTH LAKE TAHOE, Calif. (AP) — Thousands of people rushed to leave South Lake Tahoe as the entire resort city came under evacuation orders and wildfire raced toward Lake Tahoe, a large freshwater lake straddling California and Nevada.

Evacuation warnings issued for the city of 22,000 on Sunday turned into orders Monday. Vehicles loaded with bikes and camping gear and hauling



boats were stuck in traffic, stalled in hazy, brown air that smelled of campfire. Police and other emergency vehicles whizzed by.



**A firefighter is dwarfed by an aerial drop at the the Chaparral Fire in Murrieta which still blazes, Sunday, August 29, 2021. Several homes appear to be evacuated in the area**

"This is a systematic evacuation, one neighborhood at a time," South Lake Tahoe police Lt. Travis Cabral said on social media. "I am asking you as our community to please remain calm."

The new orders came a day after communities several miles south of the lake were abruptly ordered evacuated as the Caldor Fire raged nearby.

South Lake Tahoe's main medical facility, Barton Memorial Hospital, proactively evacuated 36 patients needing skilled nursing and 16 in acute care beds Sunday, sending them to regional facilities far from the fire, public information officer Mindi Befu said. The rest of the hospital was evacuating following Monday's expanded orders.

The Lake Tahoe area in the Sierra Nevada mountains is a recreational paradise for San Francisco Bay Area locals looking for a weekend getaway,



as well as a national destination. The area offers beaches, water sports, hiking, ski resorts and golfing.

South Lake Tahoe, at the lake's southern end, bustles with outdoor activities, with casinos available in bordering Stateline, Nevada.

South Lake Tahoe Mayor Tamara Wallace prepared to leave with her husband, youngest child, dogs and items given to them from their deceased parent — objects that can't be replaced.

She thought the Caldor Fire would stay farther away. Fires in the past did not spread so rapidly near the tourist city.

"It's just yet another example of how wildfires have changed over the years," she said. "It's just a culmination of 14 to 18 more years of dead trees, the droughts we've had since then, those kinds of things."

The region faces a warning from the National Weather Service about critical fire weather Monday and Tuesday.

The fire destroyed multiple homes Sunday along Highway 50, one of the main routes to the lake's south end. It also roared through the Sierra-at-Tahoe ski resort, demolishing some buildings but leaving the main buildings at the base intact.

Fire churned through mountains just a few miles southwest of the Tahoe Basin, where thick smoke sent visitors packing at a time when summer vacations would usually be in full swing ahead of Labor Day weekend.

There were reports of cabins burned in the unincorporated community of Echo Lake, where Tom Fashinell has operated Echo Chalet with his wife since 1984. The summer-only resort offers cabin rentals, but was ordered to close early for the season by the U.S. Forest Service due to ongoing wildfires.

Fashinell said he was glued to the local TV news. "We're watching to see whether the building survives," he said.

The last major blaze in the area took South Lake Tahoe by surprise after blowing up from an illegal campfire in the summer of 2007. The Angora Fire burned less than 5 square miles (13 square kilometers) but destroyed 254 homes, injured three people and forced 2,000 people to flee.

The Caldor Fire has scorched 277 square miles (717 square kilometers) since breaking out Aug. 14. After the weekend's fierce burning, containment dropped from 19% to 14%. More than 600 structures have been destroyed, and at least 20,000 more were threatened.

It's among nearly 90 large blazes in the U.S. Many are in the West, burning trees and brush sucked dry by drought. Climate change has made the region warmer and drier in the past 30 years and will continue to make the weather more extreme and wildfires more destructive, according to scientists.

In California alone, more than 15,200 firefighters are fighting more than a dozen large fires. Flames have destroyed about 2,000 buildings and forced thousands to evacuate this year while blanketing large swaths of the West in unhealthy smoke.

In Southern California, a section of Interstate 15 closed Sunday after winds pushed a new blaze, the Railroad Fire, across lanes in the Cajon Pass northeast of Los Angeles.

Farther south, evacuation orders and warnings were in place for remote communities after a wildfire ignited and spread quickly through the Cleveland National Forest on Saturday. A firefighter received minor injuries, and two structures were destroyed in the 2.3-square-mile (5.9-square-kilometer) Chaparral Fire burning along the border of San Diego and Riverside counties, according to Cal Fire. It was 13% contained Monday.

Meanwhile, the Dixie Fire, the second-largest in state history at 1,205 square miles (3,121 square kilometers), was nearly halfway contained about 65 miles (105 kilometers) north of the Lake Tahoe-area blaze. Nearly 700 homes were among almost 1,300 buildings that have been destroyed since the Dixie Fire began in early July. Containment increased to 26% on the French Fire, which covered nearly 40 square miles (104 square kilometers) in the southern Sierra Nevada. Crews protected forest homes on the west side of Lake Isabella, a popular recreation area northeast of Bakersfield.

The U.S. Department of Defense is sending 200 Army soldiers from Washington state to help firefighters in Northern California, the U.S. Army North said in a statement Saturday. Eight Air National Guard and Air Force Reserve C-130 aircraft capable of dropping thousands of gallons of fire retardant also have been sent to fight wildfires in the West.

## **12.9 'It's like a war': Greece battles increase in summer wildfires**

**Source:** theguardian.com, 30 September, 2021

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The hills in the wealthy Athens suburb of Varympompi are lined with rows of burnt trees after fires ripped through the area last August. Some pines still showed flickering signs of life, the pale brown upper branches

contrasting with their blackened trunks. Nearby wedding halls were reduced to burnt-out shells. The air still carries the smell of dust and ash.



### **The aftermath of a wildfire in Varympompi, a wealthy suburb in Athens, Greece**

Two local workers cleared burnt trees and debris from a 12 sq km (4.6 sq mile) area. “We will leave some of these, the ones that are in OK condition, in the hope that they’ll grow new trees,” said one, who gave his name only as Agilos, picking up a charred pine cone.

A seed from another tree fell on to his arm and he picked it up. “This is a good sign. it means that things will be renewed,” he said. “I just hope the trees have time to create more seeds before the next fire. If not, there will be no more pines.”

Preventing another summer of wildfires like this one is now the priority for experts and officials alike.

Forest fires are an annual occurrence in the Mediterranean, but climate change has caused stronger heatwaves and a longer, more intense, annual fire season. On average, 80% of the burned area across Europe occurs in the Mediterranean region, according to the World Wildlife Fund.

This summer was also one of the worst on record. Wildfires tore through the entire region, from Tunisia and Algeria in the south to Spain, Italy and Greece in the north. In southern Turkey and Greece, residents and tourists

fled areas ablaze as authorities struggled to deploy firefighting planes to battle the worst affected areas. The fires caused at least 86 deaths, 69 of which occurred in Tunisia and Algeria.

Two decades' of data from the European Forest Fire Information Service (Effis), provides some grounds for hope. "We are seeing a decrease in the number of burnt areas, but that is because of an increase in firefighting units," said Jesús San-Miguel-Ayanz, a specialist in fire risk management and an Effis coordinator.

The problem, he said, was unusually hot and intense summers. "We still have peaks, which are dangerous, as we have critical fires that we didn't have in the past. We are talking about unprecedented fires that have never happened in this way before."

Effis data shows that in the past 20 years, fires across the Mediterranean have declined in number as countries have scaled up their firefighting capacity. But in parallel, climate breakdown is causing longer hotter, drier summers, meaning that when blazes do occur they are far more intense, move faster and are much harder to extinguish, in part because they present a deadly risk to firefighting ground teams.

Peak years where there have been multiple intense uncontrollable blazes are also becoming more frequent. "I've been monitoring fires in Europe since the year 2000, but the number of critical years has increased," said Ayanz.

This year is the second worst year ever for forest fires in the Mediterranean after 2017, when 12m hectares of land burned across Europe and 127 people died. Countries such as Greece refocused their fire response strategy to minimise the loss of human life when fires occur, but authorities across Europe have yet to figure out how to prevent deaths and protect the environment.

Preventing forest fires is as much about human action as it is about curbing climate change. "Ninety percent of all fires globally and 95% of fires in Europe are caused by humans," said Ayanz. Prevention starts with teaching people that even littering can prove fatal, as rubbish can ignite, while cigarettes casually thrown from car windows or barbecues can easily spark fires that quickly get out of control.

Enter the volunteer fire brigade. "I think the solution to fires is simply to train volunteers," said Spyros Politopoulos, a jocular 50-year-old who is one of Greece's 2,200 volunteer firefighters, and who battled the blaze in Varympompi.

Politopoulos attributes his decision to enlist as a volunteer firefighter nine years ago to him being “an adrenaline junkie”. But as climate change increases the frequency and intensity of blazes, there will need to be more like him across the Mediterranean, especially in remote areas far from urban firefighting infrastructure. “Instead of criticising from my couch I decided to be part of my city,” he said. Now he does three shifts a month.

The solution, according to Politopoulos and his colleagues, is to expand the number of volunteer firefighters who can attend small blazes locally to prevent them from spreading.

Volunteers are an official component of firefighting units in most European countries, undergoing rigorous training in order to serve alongside their paid colleagues, and summers like this one often spark new recruits. The problem, said Politopoulos, is that volunteers often have to pay for their own equipment or rely on donations. “When you go to volunteer and your own government says you have to buy your own stuff, then we have a problem,” he said.

Long-term strategy also requires governments to look at how to prevent the accumulation of twigs, branches and other highly combustible biomass on the forest floor. Many places that experience annual forest fires, like California, use a technique known as controlled burning which involves setting supervised blazes during winter to clear the forest of material that can easily burn out of control in summer.

Greece does not use controlled burning, and global warming has made the conditions for doing it riskier, even in winter. In addition, the pine trees that populate Greece’s forests are an especially flammable species.

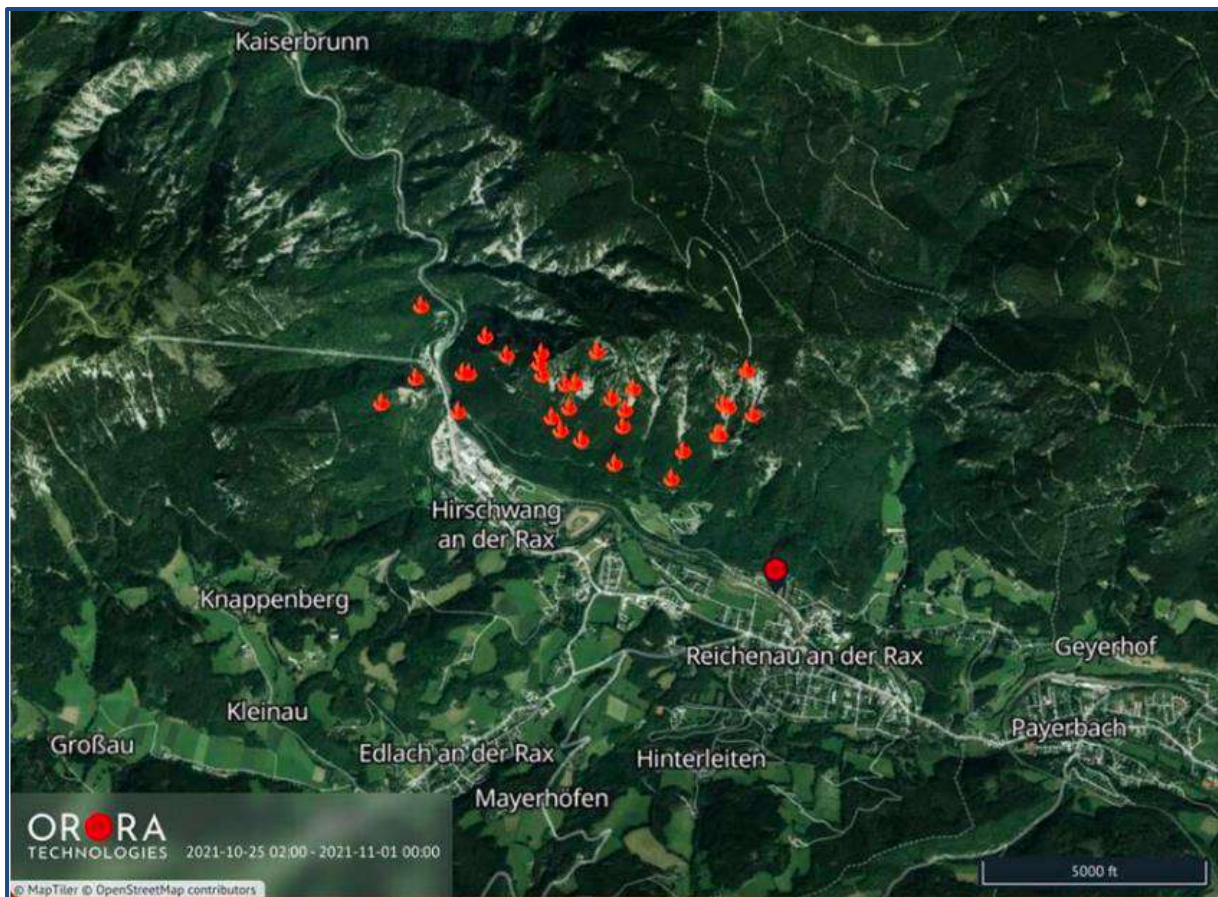
A 2018 government inquiry to investigate deadly fires in the coastal town of Mati found that Greece has spent far more on fire suppression than prevention, and called on the state to upgrade its fire prevention system. This included guidance on how the government should remove bureaucratic obstacles and allow different agencies to work together on clearing forests in winter to prevent fires. Yet little has changed, other than the creation of a new minister for the climate crisis and civil protection, appointed earlier this month in response to the destruction that occurred this summer.

“During the winter there were heavy rains, leaving many broken trees in the forest, and no one had it in their mind to clear them,” said Politopoulos, annoyed at the lack of strategy. “Fires are extinguished during winter,” he said. “It’s like a war. You should prepare during the down time, the winter, so that everyone is ready.”



## 12.10 Largest wildfire ever in Austria being battled by hundreds of personnel

Source: wildfiretoday.com, 31 October, 2021



**The icons represent heat detected by satellites from a wildfire in the Hirschwang region in Austria between Oct. 25 and Nov. 1, 2021 local time. The icons represent the approximate locations**

A wildfire in Lower Austria has grown to become the largest in recorded history of the country. It started on Monday October 25 and quickly grew to 100 hectares (247 acres) but has not spread much since then.

“The emergency services can still limit the fire area to 115 hectares (284 acres),” said Franz Resperger from the Lower Austria fire brigade on October 29. A total of 500 helpers were called in.

The fire is about 62 kilometers (38 miles) southwest of Vienna.

On October 29 the EU’s Emergency Response Coordination Center mobilized to the fire two Canadair CL-415 air tankers based in Italy, part of the EU’s rescEU transition fleet. Helicopters also responded from Germany, Italy, and Slovakia.



**Still image of the wildfire in the region of Hirschwang in Austria, October 30, 2021, from the video below**

The CL-415s are scooping water from the New Danube River.

According to the state fire brigade commander Dietmar Fahrafellner, around 750,000 liters (198,000 gallons) of water were dropped on Saturday.

It has been extremely dry in the country, especially in Lower Austria. The last time it was this dry was 35 years ago, in September and October of 1986.

## **12.11 2 dead in Kansas wildfires fueled by windy, dry weather**

**Source:** [news4jax.com](https://news4jax.com), 17 December, 2021

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Two men have died from injuries suffered in wildfires that have burned hundreds of thousands of acres across Kansas this week, authorities said Friday.

Richard Shimanek, 84, a farmer and rancher who lived near Leoti, died Thursday night at a hospital in Denver, Leoti Mayor and Fire Chief Charlie Hughes said. He was outside his home trying to fight the fire Wednesday when he fell and couldn't get up, Hughes said.

The Ellis County sheriff's office said Friday that the remains of Derrick Kelley, 36, were found near his burned vehicle in a rural area of the county. The coroner identified the remains, the sheriff's office said.



**The setting sun is shrouded in smoke from a fire that burned and stretched across Ellis, Russell, Osborne and Rooks counties Thursday, Dec. 16, 2021, near Natoma, Kan. Firefighters and emergency responders are battling fires spreading across parts of central and western Kansas after a powerful storm blew through the state**

Kelley was last seen in Hays on Wednesday, shortly before his fiancée reported him missing. The sheriff's office said he was believed to be driving on county roads toward Natoma.

Both men were killed in wildfires that erupted Wednesday in western and central Kansas, fueled by dry conditions and winds up to 90 mph (145 kph). The Kansas Forest Service said 625 square miles (1,620 square kilometers) burned in 11 counties in western Kansas, with smaller fires in other counties.

In the small town of Paradise in Russell County, one family was counting its blessings but also mourning the loss of their home and cows.

Brett Thompson, the 58-year-old mayor of Paradise, suffered eye injuries when he tried to rescue his cattle herd, said his daughter, Caity Thompson. While he was out, his home burned down — the only house in the town of about 50 to be destroyed by the fire.

His wife escaped before their home was destroyed, and the family's grain elevator business was also spared, said Caity Thompson, a teacher in Jetmore who returned home when she heard about the fire.

“It's a mixture of emotions,” she said. “We're devastated that the house is gone, along with half our cattle herd and a lot of our livelihood. But we still have the grain elevator, my grandma and sister still have their houses, and the main thing is my dad is alive.”

As the fire moved through the region Wednesday, residents in Paradise and three other small towns were evacuated, said Dustin Finkenbinder, fire chief in nearby Waldo. The fire destroyed an area about 45 miles (72 kilometers) long, he told The Kansas City Star.

“We fought fire and winds 50 miles an hour before, but nothing like maybe 100 miles an hour. So we just kind of did what we could,” he said. “As far as damage, I mean I guess catastrophic would be the right word.”

Several smaller fires across the state were contained by Friday and crews were monitoring them to prevent reignitions, said Shawna Hartman, spokeswoman for the Kansas Forest Service.

But several larger fires were still burning , some in areas that were inaccessible to ground crews, she said. Officials were using helicopters to dump water on those fires, in an attempt to knock back the flames and heat and allow ground crews in.

It will take several days to determine how many acres burned and to completely contain the blazes and make the areas safe, she said.



## **13. Sand or Dust Storms/Thunderstorms**

### **13.1 Dusty winds exacerbate looming famine in Madagascar's deep south**

**Source:** news.mongabay.com,29 January,2021

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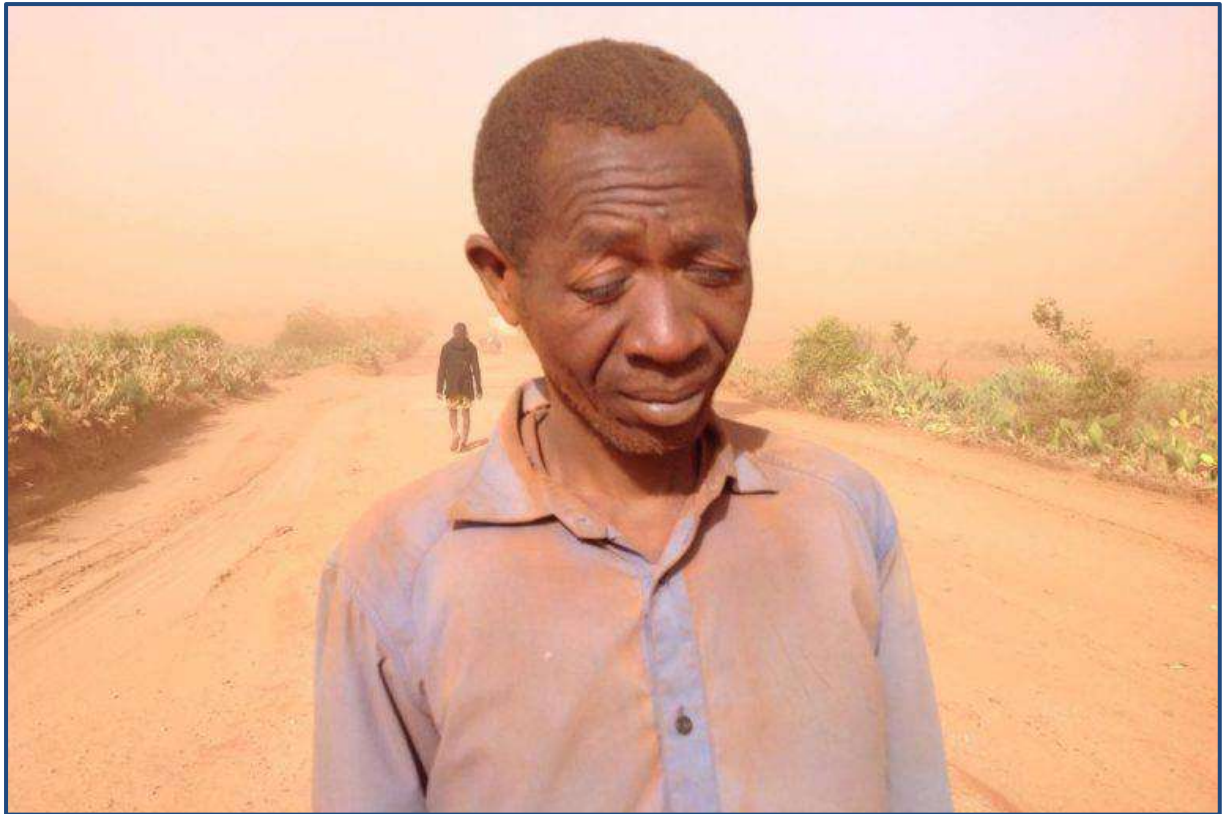
- At least 1.27 million people need humanitarian assistance in Madagascar's drought-hit deep south, according to a Jan. 18 request by the U.N. and the Malagasy government for \$75.9 million in international aid to cope with the crisis.
- The area is also experiencing dust and sand storms, a natural phenomenon known as a tiomena that is exacerbating the crisis by smothering crops, forests, buildings and roads.
- Tiomenas may be increasingly common as southern Madagascar undergoes a long-term drying trend.
- Experts say upgrading the area's water supply system is an urgent priority and recommend massive tree planting to provide wind breaks, protect soils from erosion and create more humidity.

ANTANANARIVO, Madagascar — As drought pushes more than 1 million people toward famine in southern Madagascar, violent winds have been veiling the sky with dust and sand, at times blotting out the sun.

The natural phenomenon is known locally as a tiomena: tio means "wind" in Malagasy and mena means "red." It is complicating an already precarious situation. The U.N.'s World Food Programme has urgently requested \$35 million to fund lifesaving food and cash distributions and malnutrition treatment programs. And on Jan. 18, the U.N. and the Malagasy government jointly launched a "flash appeal" for \$75.9 million in international aid to improve access to food, water, and medical care for the 1.27 million people affected. People are fleeing the area and the government is struggling to cope with waves of migration reported as of early January.

"In the area of Tanandava within Amboasary Atsimo district, all the residents have abandoned their village," Tsimanova Nazaire Paubert, an entrepreneur and student of political anthropology based in Ambovombe, the capital of the Androy region that is the epicenter of the drought and winds, told Mongabay. "All their houses were buried in the sand raised by the tiomena."





**A man during a dust or sand storm known as a tiomena in the Androy region of southern Madagascar. Image by Tsimanova Nazaire Paubert**

### **A natural phenomenon**

Tiomenas can occur almost anywhere in Madagascar when the wind blows intensely in arid, dusty areas. As a particularly dusty area with poor vegetation cover that is in the midst of a persistent drought, the deep south is especially prone to tiomenas, according to Rivo Randrianarison, a weather forecast specialist at the national meteorology service in the capital, Antananarivo.

Tiomenas resemble small versions of the massive dust or sand storms observed in the Sahara Desert or the Middle East, he said. Climate change could be a factor, he said, as soils have become drier in the area as temperatures have risen. Add deforestation, he said, and “the chances of more tiomenas occurring obviously increases accordingly.”

Randrianarison said tiomenas have always occurred, but in the past they would have affected a more limited area and, in the days before social media, received less attention.

According to Mahatante Tsimanaoraty Paubert, Tsimanova’s brother and a climate expert at the University of Toliara, the trade wind that can bring

tiomenas in southern Madagascar used to blow from mid-May to mid-October. Now, however, it blows almost all year long. The current tiomena conditions started on Oct. 29, just as they would typically have been ending, and have continued until now, he said — despite some welcome rain in the region on Jan. 19.



**Drought and persistent tiomenas have inflicted terrible damage to crops, resulting in severe food insecurity in southern Madagascar. Image by Tsimanova Nazaire Paubert**

The tiomena events are affecting an area around 200 kilometers (124 miles) wide between the Mandrare River and the town of Beloha Androy. The meteorology service has recorded at least five tiomenas so far in 2021, but

the figure is likely incomplete because there are no observatory networks in the affected areas,

according to Randrianarison.

The lack of observatories also means there's little historical data that could indicate whether tiomenas are becoming more frequent or more destructive, as Randrianarison and many local people suspect.

Elders recall a particularly destructive tiomena in 1987 that lasted five days straight, Tsimanova, the anthropology student, said. "The current ones are worse," he added.

Southern Madagascar entered the present period of desiccation about 3,000 years ago, according to research. It now appears to be trapped in a deteriorating cycle of drought, poverty, deforestation and erosion, with increasingly frequent tiomenas exacerbating the already uncertain existence there. "Tiomenas would not happen if people hadn't massively deforested ... the cactus forests and uprooted sisals for animal food," Tsimanova said

“This wind limits and disturbs the livelihood of the southern people,” Mahatante said. In the cities, the tiomenas slow everything down: all business, teaching and administrative work, he said.

But in the countryside, the situation is more worrying. The winds create dunes and pile sand on farmlands, forests, villages and cemeteries. “Fishermen can’t go out and farms face a failure of crops as the wind dries soils quickly and the particles it carries cover plants’ leaves compromise photosynthesis.”

People have been unable to grow crops since October, and the last harvest took place back in June.

“To survive, families are eating tamarind fruit mixed with clay,” Moumini Ouedraogo, the WFP representative in Madagascar, said in a Jan. 12 press release. “We can’t face another year like this. With no rain and a poor harvest, people will face starvation. No one should have to live like this.”

Even the cactus, which rural people rely on for food during drought, have dried up, and dust or sand has destroyed the few wells that exist. Water is scarce and the price has gone up: 20 liters (5.3 gallons) costs 2,000 ariary, or \$0.52 — if this luxury is even.

### **Illness on the wind**

As if hunger weren’t enough, tiomenas carry additional public health risks, according to Tsivahiny Paubert, a medical doctor and chief of the regional hospital in Ambovombe. (The three Pauberts mentioned in this story — Tsimanova Nazaire Paubert, Mahatante Tsimanaoraty Paubert and Tsivahiny Paubert — are brothers.)

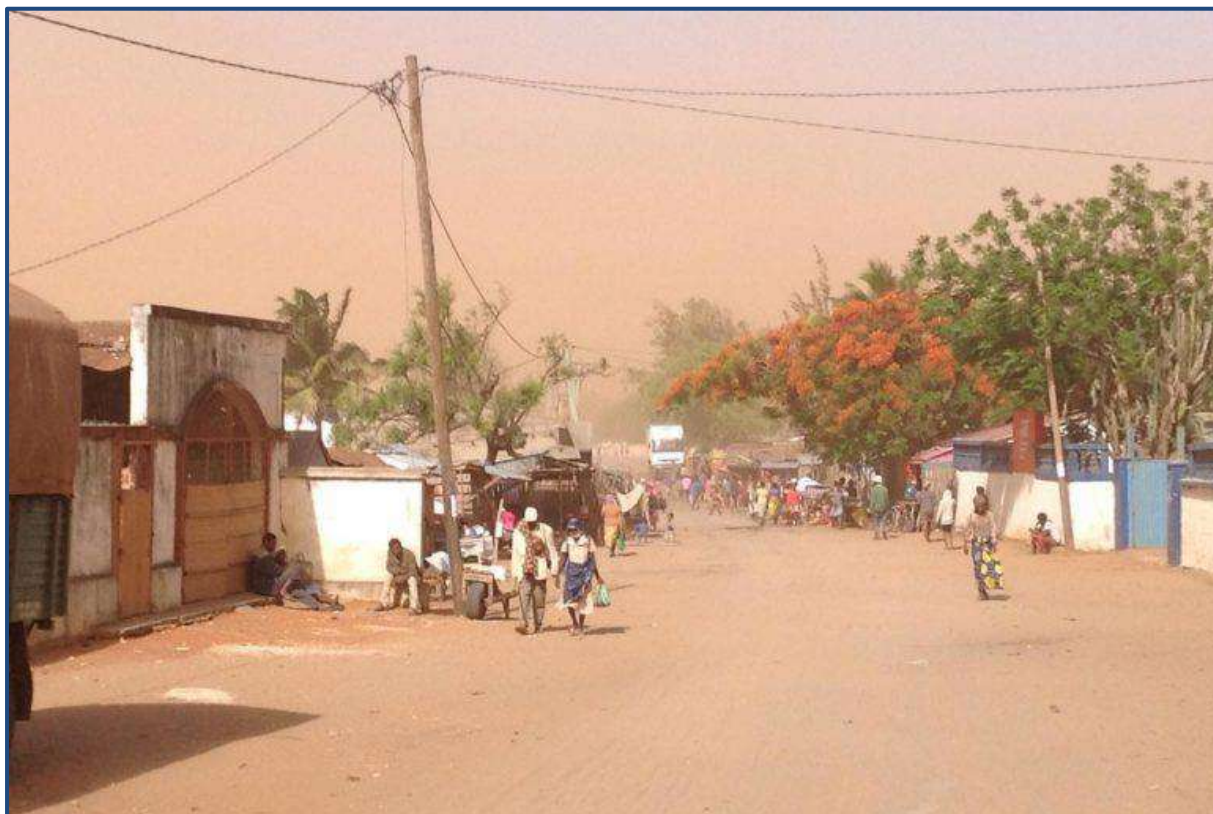
As direct consequences, Tsivahiny says, more and more children under the age of 5 are suffering from fever, respiratory infections, diarrhea, and eye problems. “Toilet use rate is low in the south,” Tsivahiny said. “People are used to defecating in the wild. When tiomena comes, the blowing dust or sand carries human excrement with microbes.”

Tiomenas can cause a slow death. Tsivahiny said his department has noticed increased cases of depression and cardiovascular problems such as strokes because of the distressing living conditions. “Even 25-year-olds are affected today. It’s a new trend,” he said.

He attributes a number of other poor health effects to the tiomenas and drought. With condoms the last thing on anyone’s mind, he said there has been an “explosion” of HIV/AIDS infections. His service has been recording two or three new cases weekly, including among children, compared with

two per month previously. Prenatal consultations have declined significantly and poisonings have shot up due to reliance on medicinal plants among the desperately poor. And he's noticed a widespread decline in social cohesion resulting in increased fragility and vulnerability among the local population.

"We will have orphans from HIV/AIDS beyond the deaths attributable to famine," Tsivahiny said.



**A section of the city of Ambovombe, capital of Androy region, during a tiomena. Image by Tsimanova Nazaire Paubert**

### **'Impossible without water'**

As dire as the situation in southern Madagascar may seem, experts insist it's possible to turn it around.

"Tiomena is a natural disaster which could be put under control," said Tsibara Mbohoahy, an environmental expert at the University of Toliara and head of the Androy Regional University Center in Ambovombe. "For the resilience of the community, water is the unique solution to eradicate famine and protect soils from erosion. It is a socioeconomic, health and environmental solution all at once."

The U.N.'s recent flash appeal includes plans not only to truck in water to meet immediate needs but to rehabilitate and expand the region's existing

system to supply water for human and animal consumption and for agriculture, including the possible addition of desalination units.

For his part, Mahatante advocates massive tree planting in the region. Trees would serve as a wind break, protect soils from erosion and create more humidity. But such plantings are “impossible without water,” he said.

Nevertheless, on Jan. 19, the government launched the national tree-planting campaign for the year in Tolagnaro, the capital of the Anosy region, just east of Androy, and four days later, it launched the Androy regional campaign in the commune of Ankilivalo Ambovombe. There people planted 30,000 fatiolitse trees (*Alluaudia montagnacii*), a species endemic to the country’s spiny forests, toward a goal of reforesting 100 hectares (247 acres) in the area this year. Madagascar aims to plant trees on 75,000 hectares (185,000 acres) throughout the country in 2021, against 40,000 hectares (99,000 acres) in 2020.

### **13.2 Sandstorm from Sahara on its way to the UK set to leave dust on cars**

**Source:** liverpoolecho.co.uk, 22 February, 2021

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A sandstorm from the Sahara is on its way to the UK, according to forecasters.

Colourful sunsets and sunrises caused by Saharan dust brought across the UK by high-level winds have already been spotted in the east of England.

But as well as stunning skies, Brits may need to give their car a once-over due to dust deposits.

Speaking on GMB, meteorologist Laura Tobin said: "There was a big sandstorm in Africa across the Sahara.

"All of this sand has slowly tracked its way westwards and then it is set to head towards our shores.

"So we, through the next few days, are set to see sand from the Sahara deposited on our cars, you'll see a little trace if you run your finger across.

"Another thing it will do, which perhaps will make up for the fact we have this dust on our car, is create some beautiful sunrises and sunsets.

"Weather-wise for the next couple of days, it is set to be mild but there is still some rain."



Tonight it will be misty but with largely clear skies, however, winds will start to pick up through the night.

Tomorrow will be largely cloudy and unsettled, with spells of heavy rain across northern and western areas.

The heaviest showers are likely in Scotland and Northern Ireland. It will be drier further east but mostly cloudy throughout. It will be another mild but windy day, especially in the north.

The unsettled weather and rain are expected to continue into Wednesday in northern and western regions. Some heavy local showers can be expected.

### **13.3 Beijing enveloped in hazardous sandstorm, second time in two weeks**

**Source:** reuters.com, 28 March, 2021



BEIJING (Reuters) - The Chinese capital Beijing woke on Sunday morning shrouded in thick dust carrying extremely high levels of hazardous particles, as a second sandstorm in two weeks hit the city due to winds from drought-hit Mongolia and northwestern China.

Visibility in the city was reduced, with the tops of some skyscrapers obscured by the sandstorm, and pedestrians were forced to cover their eyes as gusts of dust swept through the streets.

“It’s quite serious today. There’s always a day or two like this (of pollution or dust) each month,” said Mr. Fan, 39, who did not wish to disclose his full name.

Beijing’s official air quality index reached a maximum level of 500 on Sunday morning, with floating particles known as PM10 surpassing 2,000 micrograms per cubic metre in some districts.

Readings of smaller PM2.5 particles were above 300 micrograms per cubic metre, far higher than China’s standard of 35 micrograms.

PM2.5 particles are especially harmful because they are very tiny and can enter the bloodstream, while PM10 is a larger particle that can enter the lungs.

The China Meteorological Administration issued a yellow alert on Friday, warning that a sandstorm was spreading from Mongolia into northern Chinese provinces including Inner Mongolia, Shanxi, Liaoning and Hebei, which surrounds Beijing.

The meteorological office said the recent sandstorms to hit Beijing originated from Mongolia, where relatively warmer temperature this spring and reduced rain resulted in larger areas of bare earth, creating favorable conditions for sandstorms.

Beijing might face more sandstorms in April due to the unfavorable weather this year, the meteorological office said.

### **13.4 Wall of sand engulfs Chinese town**

**Source:** [phys.org](https://phys.org), 27 April, 2021

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A towering wall of sand rushed over factories and apartment blocks in northwestern China's Gansu province as seasonal sandstorms barrelled across the country, causing air pollution and traffic accidents.

Aerial images as it struck showed an apocalyptic scene as a billowing cloud of yellow dust smothered Gansu's Linze county on Sunday.

State media CCTV reported multiple car accidents in the province caused by low visibility, while meteorologists have warned people to stay indoors and keep windows shut with more storms expected across northern China on Tuesday.

China suffers from enormous dust storms each spring that lift sand from the Gobi desert and dump it onto cities as far away as Shandong on the eastern coast.



**Aerial photos showed a sandstorm engulfing a village in Linze county, in the city of Zhangye in China's northwestern Gansu province**

A sandstorm that pushed air pollution levels off the charts hit Beijing in March, turning the sky a dark yellow and forcing airlines to cancel hundreds of flights.

It was the worst sandstorm in a decade to hit the capital, which has pinned hopes of rebuilding a natural barrier to such phenomena on intensive tree replanting in stripped forest areas, also known as the "green great wall".

Beijing said last year it expected fewer and weaker sandstorms to hit northern China due to the reforestation efforts.

**13.5 4 killed as dust storm, rain hit parts of Karachi after severe heat spell**

**Source:** dawn.com, 18 May, 2021

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At least four people were killed in roof collapse incidents after a dust storm followed by light rain hit parts of Karachi on Tuesday evening, after the city remained in the grips of a severe heat spell for two days.

The gusty winds could be seen flying objects around as the dark clouds covered parts of the city.

Soon after the weather conditions changed, residents in some areas reported power outages.



### **A general view shows Karachi on May 18 during dust storm**

The districts in lower Sindh including Karachi have been under the influence of cyclonic storm Tauktae, and on Monday the mercury rose to 43.5 degrees Celsius in Karachi.

Sardar Sarfaraz of the Met department told Dawn.com that the dust storm was caused due to the influence of the cyclone system being in southern Pakistan's vicinity combined with local weather conditions.

He said Karachi could experience gusty winds again until the cyclone system is out of the region.

Sarfaraz noted that the city's temperature had fallen by 7-8 degrees soon after the dust storm, saying it was likely to drop further as the weather normalises.

The official had earlier told Dawn that the storm had started dissipating and weather in lower Sindh would improve by Wednesday as the sea breeze blocked by the storm would resume.

The strong winds caused roofs to collapse in several areas, killing a man and a woman in Dabba Colony, a nine-year-old child in Shershah, and a man in Baldia No. 14, according to a Karachi Police statement.

Meanwhile, traffic was moving slowly in a Nazimabad area after a tree fell down on a road. Traffic coming from the Habib Bank towards Nazimabad was diverted to the flyover.

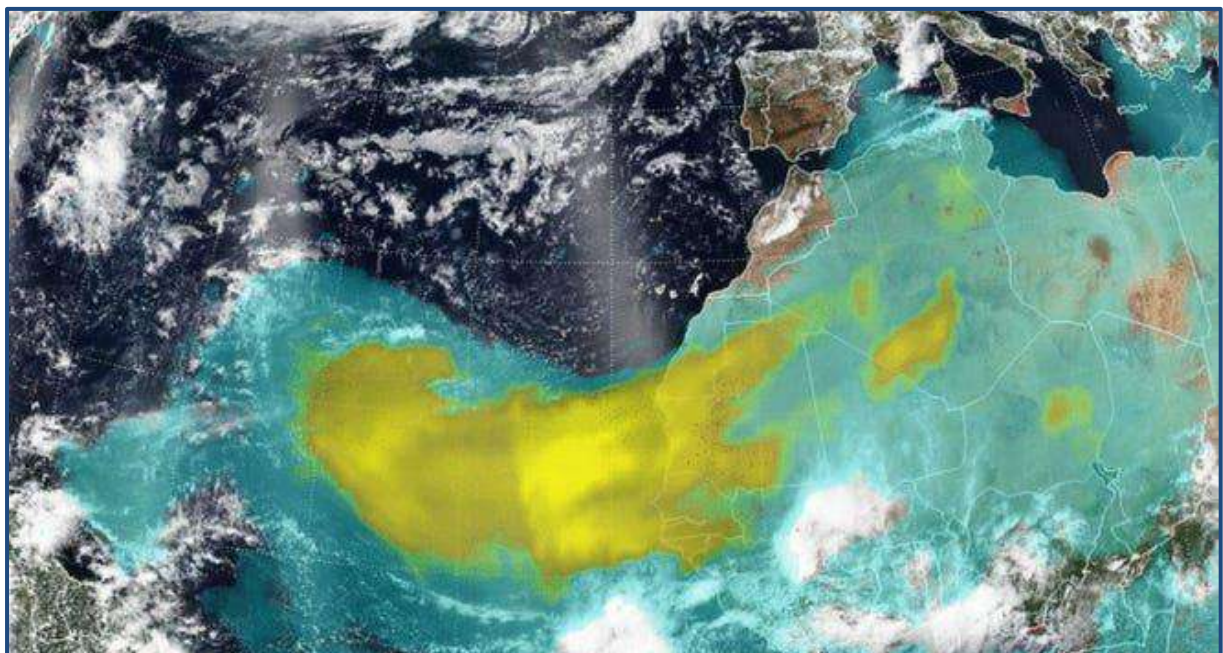
In an alert on Tuesday, the Pakistan Meteorological Department said Tauktae, after intensifying into an "extremely severe cyclonic storm", had crossed Gujarat in India last night and weakened into a severe cyclonic storm laying over Rajasthan, India.

"A few dust/thunderstorm-rain [spells] accompanied with gusty winds of 30-50km/h may occur in Tharparkar and Umerkot districts during next 12 hours," the advisory said, adding that hot and dry weather will continue on Tuesday (today) in Karachi, Hyderabad, Shaheed Benazirabad, Badin and Mirpurkhas districts.

According to the alert, sea conditions will remain rough till Tuesday evening and fishermen of Sindh are advised to avoid going into deep sea. "They can resume their activities from tomorrow," it said.

### **13.6 Saharan dust storms, more frequent and more intense, headed to Florida, researchers say**

**Source:** floridatoday.com, 14 June, 2021



#### **NASA researchers are split on weather climate change will result in more or fewer Saharan dust storms**

Orange hazy skies will blanket the Sunshine State by mid week and last through Saturday, forecasters predict.



But new NASA research is split on whether Florida will see more or less of these yearly Saharan dust storms that fuel red tides and many a sneeze.

One new NASA study predicts climate change will drive more frequent and intense dust storms off Africa. Another by the same agency says the opposite.

Dust off the Sahara fertilizes the Atlantic Ocean and American soils. The good news is it can blunt tropical storms, but it also feeds red tide, the Sargassum seaweed that piles up on our beaches every summer and other harmful algae blooms.

Some 60 million tons of the Sahara's nutrient-laden mineral dust lofts into the atmosphere annually, according to NASA, creating a massive layer of hot, dusty air that whisks across the Atlantic with the winds to deliver those nutrients to the ocean and plants in the Caribbean and South America.

The airborne particles block and/or reflect sunlight. In heavy doses near ground, the dust fouls air quality.

In early June, strong winds blew across Mali and Mauritania, carrying the Saharan dust over Senegal, Gambia and Cabo Verde, NASA's Earth Observatory reported in a release. Data from the Visible Infrared Imaging Radiometer Suite (VIIRS) on the NASA-NOAA Suomi NPP satellite shows the dust was well out over the central Atlantic Ocean by June 7.

The storm comes a year after NASA documented the largest dust storm in two decades of observations. Saharan dust covered the Caribbean Sea in June 2020, dimming skies over several southeastern states. During that event, satellite and ground sensors measured the highest dust levels in the atmosphere since NASA's Earth Observing System satellites were launched.

University of Kansas researchers used data from NASA's Terra and Aqua satellites, Suomi NPP, the joint NASA-CNES CALIPSO satellite, and ground stations to outline how winds carry dust across vast distances.

"The African easterly jet [stream] exports the dust from Africa towards the Atlantic region" said lead author of the study, Bing Pu, said in a NASA release. "Then the North Atlantic subtropical high, which is a high-pressure system sitting over the subtropical North Atlantic, can further transport it towards the Caribbean region. The Caribbean low-level jet, along with the subtropical high, can further transport the dust from the Caribbean region towards the States."

Pu and colleagues hypothesize that climate change will make dust storms more frequent and intense. Higher temperatures will bring more dry air and

less vegetation to the Sahara, providing more loose, dusty material to be picked up by winds, they say. Stronger storms and winds in a warmer world also will provide more energy to carry the dust.

A research team led by atmospheric scientist Tianle Yuan of NASA's Goddard Space Flight Center predicts the opposite.

When the northern Atlantic warms relative to the south Atlantic, trade winds that blow the dust east to west will weaken, the NASA researchers said in the release, transporting less dust from the Sahara. Weaker winds also will enable steadier bands of rain to traverse the tropics and drift north over more of the desert, further dampening dust.

Yuan's team says Africa's yearly dust plumes might actually shrink over the next 100 years. They argue changes in ocean temperatures will lower prevailing winds and therefore the transport from Africa to the Americas. They also say the wind changes will increase moisture flowing into Africa, leading to more rain and vegetation, reducing dust in the Saharan and Sub-Saharan regions. Global warming could lower Saharan dust by 30% over the next 20 to 50 years, they say, and keep declining after that.

The Sahara Desert is 3.6 million square miles of arid land stretched across the northern half of Africa, slightly smaller than the continental United States.

"Dust plays a major role in the Earth system," said Hongbin Yu, an atmospheric researcher at Goddard. "A decrease of dust as the climate warms may have profound influences on a variety of phenomena, but these potential impacts may be good or bad."

### **13.7 A Dust Storm Caused One of the Deadliest Car Crashes in Utah Ever**

**Source:** vice.com, 26 July, 2021

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Eight people are dead after a dust storm, fueled by the drought devastating the western United States, engulfed a portion of highway in central Utah Sunday afternoon.

Video of the crash's aftermath, captured by drivers on the opposite side of the highway, shows a seemingly never-ending line of cars, trucks, and metal strewn across Interstate 15 in Millard County, Utah. The massive collision, which happened at around 4 p.m. Sunday, involved 22 vehicles and left eight travelers dead, including several children, and many others injured and in critical condition, according to authorities. Local police said it's one

of the worst crashes they've ever seen—and climate change is to blame. The bone-dry conditions, catalyzed by the ongoing climate crisis, left excessive dirt and dust on the desert floor, which a thunderstorm subsequently whipped up, according to local weather reports.



**Cars and trucks collided on interstate 15 in millard county, utah, on sunday, july, 25, 2021, du a dust storm**

“We have a little moisture in place, and that’s why we have these mountain thunderstorms in central Utah,” Chase Thomason said during a weather report on local station KUTV following the crash. “But there wasn’t enough moisture to equalize, and some really cool air came out of that thunderstorm, picked up the dust and the dirt, and blew it right onto I-15. And visibility just like that dropped to near zero.”

The storm overtook drivers on the highway with no warning, giving them no time to adjust their driving. The portion of road where the crash occurred, about 145 miles south of Salt Lake City, is still closed.

“I can't remember in recent memory of [a crash] being this large, with this many vehicles and this many fatalities,” Sgt. Cameron Roden of the Utah Highway Patrol told KUTV on Sunday. “We have vehicles all over. Several vehicles tried to swerve off the roadway. We have vehicles that are flipped up on their sides. One of the vehicles that was pulling a trailer, the trailer has pretty much completely been destroyed and is on the freeway.”

As drought and abnormal weather patterns continue, dust storms—and their effects—are likely to become exponentially more frequent and intense in the coming decades.

### **13.8 Sandstorms and rainfall: Israel braces for dramatic weather shift**

**Source:** ynetnews.com, 12 August, 2021



#### **Winter weather in central Israel**

Israel on Wednesday was bracing for a dramatic day full of weather changes that is set to include dry and windy weather in the first part of the day and heavy rainfall in the evening.

In the first part of the day the weather is expected to be extremely dry and windy, with sandstorms expected in the Negev area in southern Israel

By afternoon hours, the weather is expected to shift, with rain falling in northern Israel and spreading to the center of the country. The rain is expected to increase gradually, and will be accompanied by strong winds.

Thunder, lightning and hail are also expected in some parts of the country and there might be flooding along the Israeli coastal plain. Light snow is also expected at the upper levels of Mount Hermon.

The Environmental Protection Ministry warned about very high air pollution in the Negev and high to very high in the rest of Israel.

Therefore, certain populations - those with heart disease, lung disease, elderly, children, and pregnant women - are recommended to avoid strenuous exercise activity outside. The rest of the public is advised to minimize workout activity outside.

In the meantime, due to strong winds this morning, a palm tree collapsed on a synagogue in northern Israel, fortunately, no one was hurt.

Throughout the night, the rain will weaken, but temperatures will still remain low. It is possible that snow may continue to fall on Mount Hermon, and flood warnings would remain across the coastal areas.

On Thursday, local rain expected mostly in the morning hours. Dry weather will return on Friday and Saturday, and the temperatures will increase.

On Wednesday, in the northern city of Haifa, the temperatures will range from 17 degrees Celsius during the day to 13 degrees at night. In Tel Aviv, the weather will be similar with a range of 19 degrees during the day and 14 degrees at night. In the southern city of Be'er Sheva, temperatures will range from 18 degrees throughout the day to 8 degrees at night. In Jerusalem, the temperatures will be cooler, reaching 15 degrees during the day and falling to 8 overnight, while in the southernmost city of Eilat the weather will remain warm with 24 degrees during the day and 15 at night.

### **13.9 Massive Dust Storm in Brazil Turned Day Into Night, Swallowing Cities in Clouds of Dust**

**Source:** natureworldnews.com,30 September,2021

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On Sunday afternoon, a huge dust storm enveloped parts of Sao Paulo, Franca, Ribeirao Preto, Aracatuba, Barretos, and Presidente Prudente. Brazilians used social media to post photos and videos.

#### **Dust Storm in Brazil**

Dense clouds of dust reach up into the sky and surround sections of Barretos, Morro Agudo, Bebedouro, and Viradouro in a video published on YouTube. According to Agência Brasil, the national public news agency, residents of Ribeirao Preto, Aracatuba, Jales, Franca, and Presidente Prudente in the state of So Paulo experienced the terrible strength of the light-swallowing sandstorm. According to agency authorities, cities in a neighboring state, Minas Gerais, were also engulfed in dust.

"The day changed into night," Nacho López Amorn, a meteorologist for the Argentinian television station Canal de la Ciudad, tweeted on Sept. 27.





## **Haboob**

A haboob is a storm in which powerful winds whip up a massive wall of dust that can reach hundreds of feet in height. According to the American Meteorological Society (AMS), the term "habb" originates from the Arabic word "habb," which means "to blow," and these fast-moving dust walls, which generally occur in the wake of thunderstorms, are frequent in dry regions of the world.

Haboobs are uncommon in this area of Brazil, but recent high temperatures and dry conditions in the region fuelled powerful winds that churned up a blinding storm cloud near Ribeiro Preto, with gusts of 57 mph (92 km/h), according to Andrea Ramos of Brazil's National Institute of Meteorology.

"The winds assisted in bringing the dust up from the earth, [and] the heat wave raised the temperature since humidity levels were below 20%," Ramos said in a statement.

On the other hand, residents of So Paulo shouldn't expect another dusty haboob any time soon, according to Ramos. "We won't have the conditions favoring such a catastrophe again," she added, referring to the beginning of colder temperatures in northern Brazil and the predicted rain this month.

## **Sandstorms**

Strong winds transport enormous volumes of sand and dust from bare, dry soils into the atmosphere, causing sand and dust storms. Scientists have realized the consequences on climate, human health, the environment, and many socio-economic sectors during the previous decade. Members of the World Meteorological Organization (WMO) are at the forefront of assessing these consequences and developing products to assist preparedness, adaptation, and mitigation measures.

In dry and semi-arid areas, sand and dust storms are typical weather dangers. Thunderstorms - or severe pressure gradients associated with cyclones - increase wind speed over a large region, which causes them. Strong winds carry enormous volumes of sand and dust up into the atmosphere from bare, dry soils, carrying it hundreds to thousands of kilometers distant. Dust particles from wind erosion account for 40% of aerosols in the troposphere (the lowest layer of the Earth's atmosphere).

The dry regions of Northern Africa, the Arabian Peninsula, Central Asia, and China are the primary producers of these mineral dusts. Australia, America, and South Africa, in comparison, provide modest but significant contributions. Global dust emissions estimate ranges from one to three Gigatons per year, based primarily on computer models.

### **13.10 ‘Just came out of nowhere’: Thargomindah SWALLOWED by spectacular dust storm in southwest Queensland**

**Source:** 7news.com.au, 29 October, 2021

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The mayor of a Queensland region engulfed by a spectacular dust storm says the weather event “just came out of nowhere”.

Thargomindah and surrounding areas in the state’s southwest were turned red on Thursday evening.

Bullo Shire Mayor John Ferguson said he was alerted to the storm when someone in the council building said, “look what’s coming down the road here”.

“It just kept blowing and blowing and blowing,” he said.

“We’ve had dust storms here before, but this one just came out of nowhere,” Ferguson added.



### **The dust storm hit Thargomindah on Thursday evening**

“Most dust storms, you know they’re coming.

“They come from way out in the desert and they take 2-3 days to roll in here.

“But this one sort just started and away it went.”

### **What caused the dust storm?**

James Thompson, from the Bureau of Meteorology, said the phenomenon was the result of a combination of conditions.

“We saw 93km/h winds gusts at Thargomindah, accompanied by a dust storm associated with the outflow of that storm,” he said.

“We had a trough moving through that area yesterday and that really brought those ferocious winds associated with those storms, which kicked up those dusty conditions.

“We did see the dust extend all the way into NSW, so it was quite extensive which is rather unusual.”

The system also caused damage to structures in Goondoowindi, as well as bringing heavy rain and lightning to the southeast.

Gatton and Laidley recorded 50mm of rain in 30 minutes, Thompson said.

He said there was a risk of further storms in the state's southwest on Friday, while the southeast is likely to be would be in the firing line of wild weather on Saturday.

### **13.11 Severe dust storm engulfs Uzbekistan**

**Source:** eurasianet.org,5 November,2021



#### **Tamerlane gets a bath**

A severe sand and dust storm – the worst since meteorological records began – has struck Uzbekistan.

On the evening of November 4, a haze engulfed Tashkent and most other areas, with the exception of the most northerly region, as a cold front swept in and a strong wind blew sand and dust across the country.

“Under the influence of gusts of wind, the parched upper layer of soil rose up, creating the effect of a dust and sand haze, with a deterioration in visibility to 100-200 meters in a number of districts in the country,” Uzbekistan’s meteorological service, known as Uzgidromet, told Gazeta.uz.

It also confirmed a popular belief that Uzbekistan’s construction boom had exacerbated the situation.

“Of course, large-scale construction works, which are under way in many regions of the country, made their contribution to the emergence of this

phenomenon, inasmuch as they generate very large amounts of gritty materials.”

The dust storms, which started in southern Kazakhstan, were most severe in Tashkent and the southern Syrdarya Region, and Kazakhstan’s Turkestan Region, Uzgidromet said.

Dust storms are frequent in Uzbekistan. In 2018, a cataclysmic storm engulfed the region of Karakalpakstan with salt left behind when the Aral Sea dried up.

“However, usually volumes of sand and dust that are raised into the air disperse and settle on the ground soon after the wind drops,” Uzgidromet noted.

In this case, a mass of cold air prevented this from happening. Instead, an inversion layer formed, in which temperatures stop falling with elevation but rise instead. This is a meteorological condition that contributes to smog.

Because of this, “a phenomenon unusual for our region arose – a dust haze,” Uzgidromet explained.

This sand and dust storm was the first of its kind since Uzbekistan started keeping meteorological records 150 years ago.

Uzgidromet said it would persist until November 6.

“It looked foggy outside but that was dust haze,” a resident of Tashkent told Eurasianet. “I started feeling dust in the air outdoors, though there was no strong wind. Some time later, I smelt dust indoors, though the windows were tightly closed.”

By 9 p.m. on November 4, the concentration of dust in Tashkent’s air was 30 times the permitted level. The next afternoon, it was still 10 times over. Ambulance services around the country received 4,000 calls seeking help for respiratory problems.

The Ministry of Health advised residents to stay indoors; wear facemasks outdoors; close windows; place damp towels at doorjambs; and rinse throats and noses with saline water.

The authorities provided some extra-tender care to one well-known figure, judging by a photo posted online.

It showed workmen hosing down the statue of national hero Amir Temur (Tamerlane) in Tashkent, the landmark Hotel Uzbekistan looming out of the haze behind him.



## **13.12 Dust storms, rain expected to hit various parts of Egypt Sunday**

**Source:** english.ahram.org.eg, 18 December, 2021



**Dust storms are likely to hit various parts of the country on Sunday, followed by rainfall for three days, the Egyptian Meteorological Authority (EMA) said on Saturday**

Dusty winds could create sandstorms across the country on Sunday, including parts of Greater Cairo, Lower Egypt, northern coast, cities of the Suez Canal, and northern Upper Egypt.

The sandstorms are expected to cause poor visibility and lower the temperature, the EMA said.

Moderate to heavy rain accompanied by thunderstorms is expected along the northern coast and Delta on Sunday and Monday.

This includes the governorates of Matrouh, Alexandria, Beheira, Kafr El-Sheikh and Damietta on both days as well as the governorates of Daqahliya and Port Said on Monday.

Snow is expected in the mountains of central Sinai on Sunday.

On Sunday night, areas in the Greater Cairo and southern Delta area, including the governorates of Gharbiya, Sharqiya, Menoufiya, and Daqahliya as well as the cities of the Suez Canal and northern Upper Egypt may be hit by light to moderate rain.

On Monday, moderate rain that may turn to a thunder storm is also expected in areas of the Greater Cairo and southern Delta, including Gharbiya, Sharqiya, and Menoufiya.

Moderate rain and thunder may also affect the Sinai Peninsula, the Suez Canal cities and northern Upper Egypt's Beni Suef, Fayoum, and Minya on Monday.

Over these two days, unstable weather may disturb navigation in the Mediterranean, causing waves to rise to 2-4 metres on Sunday and to 4-5 metres on Monday.

On Tuesday, light to moderate rain is expected in areas of the northern coast and northern Delta.

On Wednesday, light rain is possible along the northern coast.

Very cold nighttime weather is expected to prevail across Egypt on Sunday and Monday, the EMA said.

Northern Egypt will experience cold daytime temperatures, while moderate daytime temperatures will prevail in southern Egypt.

From Sunday to Friday, highs of 15-19 degrees Celsius and lows of 9-11 are expected in Greater Cairo and Lower Egypt.

Highs of 15-18 degrees and lows of 11-12 are expected along the northern coast.

South Sinai will see highs of 19-23 degrees and lows of 12-14.

Northern Upper Egypt will see highs of 15-19 degrees and lows of 6-7, while southern Upper Egypt will witness highs of 19-23 degrees and lows of 9-10 over these days.

## **14. Volcanic Eruption and Earthquake**

### **14.1 Indonesia's Most Active Volcano Erupts**

**Source:** [npr.org](https://www.npr.org), 27 January, 2021



Mount Merapi, Indonesia's most active volcano, erupted Wednesday, emitting a river of lava onto the mountain below and gas clouds into the sky.

The eruption set off the volcano's longest lava flow since the danger level for Merapi was raised in November, Hanik Humaida, the head of Yogyakarta's Volcanology and Geological Hazard Mitigation Center, told The Associated Press. Sounds of the eruption could reportedly be heard almost 18 miles away. The 9,737-foot volcano sits on the densely populated island of Java and near the ancient city of Yogyakarta. It has repeatedly erupted recently, keeping local officials and residents living nearby on a state of alert. In November, local authorities evacuated nearly 2,000 people who lived in the Java mountain districts of Magelang and Sleman after Merapi erupted. Earlier this month, authorities evacuated more than 500 people in Magelang after the volcano spewed hot clouds of ash. No residents were evacuated as

of 5:30 a.m. EST, but Indonesian authorities are closely monitoring the volcano's activity. People were told to stay out of the 3-mile danger zone around the crater.

Merapi's last major eruption in 2010 killed 347 people. Indonesia, an archipelago of 270 million people, sits along the Pacific "Ring of Fire," a horseshoe-shaped series of seismic fault lines around the ocean. That location leaves the country prone to earthquakes, volcanic activity and tsunamis. In August, Indonesia's Mount Sinabung, located on Sumatra Island, spewed a plume of ash several miles into the sky posing health and aviation risks for days. A series of eruptions in 2018 at the Anak Krakatau volcano, which also triggered a deadly tsunami, caused serious damage and forced authorities to reroute flights.

## **14.2 Iceland sees string of earthquakes in southwest region**

**Source:** [icenews.is](https://www.icenews.is), 25 February, 2021



Yesterday, Iceland saw a string of earthquakes, with the maximum of those reaching 5.7 on the Richter Scale. The epicenter of the quakes was recorded in the Reykjanes Peninsula region, roughly 40 kilometers from the capital, Reykjavík. The effects of the series of earthquakes were felt across the



majority of the western part of the country, reaching as far as the Westman Islands in South Iceland and Stykkishólmur, over 200 kilometers away from Reykjavík. It was noted by the Department of Civil Protection and Emergency Management that the Icelandic Met Office's automatic earthquake system detected a total of 12 shocks of more than 4 in magnitude from the beginning of the first wave.

Volcanologist at the University of Iceland, Ármann Höskuldsson, told Kjarninn that they're investigating whether the recent activity was caused by the Eurasian and North American tectonic plates pulling away from each other or rubbing together. Also, part of the investigation was whether the ground is lifting, which would help to determine if a volcanic eruption is on the way or not. Kristín Jónsdóttir, the leader of a natural disasters group at the Icelandic Met Office, mentioned that yesterday's activity was both powerful and unusual. She also noted that Civic Protection had been in talks and concluded that there is "an increased chance of more and even stronger quakes."

### **14.3 Taal records 302 volcanic quakes in 24 hours: Phivolcs**

**Source:** news.abs-cbn.com,27 March,2021



**Patterns of erosion made from volcanic ash are seen on Taal volcano island**



MANILA - Taal volcano has recorded 302 volcanic earthquakes in the last 24 hours and is showing signs of increased magmatic activity, Phivolcs said Saturday.

In its 8 a.m. bulletin, it said the 302 volcanic earthquakes includes 184 episodes of volcanic tremor with a duration of 1 to 12 minutes, and 118 low frequency volcanic quakes.

“Activity at the Main Crater consisted of weak emission of steam-laden plumes from fumarolic vents that rose 30 meters. Sulfur dioxide (SO<sub>2</sub>) emission that averaged 925 tonnes/day was measured yesterday, 26 March 2021. Temperature highs of 71.8°C and pH of 1.59 were last measured from the Main Crater Lake respectively on 04 March and 12 February 2021,” the bulletin said.

Phivolcs noted that ground deformation indicated a very slow and steady inflation and expansion of the Taal region since after the January 2020 eruption.

“These parameters may indicate increased magmatic activity at shallow depths beneath the edifice,” it added. The volcano is still at alert level 2 (Increased Unrest) and under constant evaluation.

“DOST-PHIVOLCS reminds the public that at Alert Level 2, sudden steam-driven or phreatic explosions, volcanic earthquakes, minor ashfall, and lethal accumulations or expulsions of volcanic gas can occur and threaten areas within and around TVI (Taal Volcano Island).” it said.

It recommended that entry into Taal Volcano Island, Taal’s Permanent Danger Zone or PDZ, especially the vicinities of the Main Crater and the Daang Kastila fissure, and occupancy and boating on Taal Lake, must be strictly prohibited.

"Local government units are advised to continuously assess and strengthen the preparedness of previously evacuated barangays around Taal Lake in case of renewed unrest," it said.

Civil aviation authorities must also advise pilots to avoid flying close to the volcano as airborne ash and ballistic fragments from sudden explosions and wind-remobilized ash may pose hazards to aircraft.

## 14.4 Earthquake Swarm Hits World's Largest Volcano

**Source:** weatherboy.com, 31 March, 2021

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An earthquake swarm continues on Mauna Loa, known as the world's largest active volcano. While nearby smaller Kilauea Volcano is erupting, Mauna Loa is not yet at this time. But that could change with time.

Beginning at 2:30 am HT on March 29, 2021, the U.S. Geological Survey's (USGS) Hawaiian Volcano Observatory (HVO) recorded over 130 earthquakes beneath the northwest side of Mauna Loa's summit, about 26 miles west northwest of the town of Volcano, Hawaii. According to HVO, most of these earthquakes are occurring in a cluster about 1 mile wide and 3.5–5 miles below the surface.

The swarm continues this morning, with a 2.6 earthquake recorded in Pahala at 2:03 am HT.



**Kilauea at sunrise: with the sun up, scientists can begin to see the extent of last night's eruption on Hawaii's Big Island**

The largest event in the sequence, so far, was a magnitude-2.7 earthquake, with the bulk of the events being less than magnitude-2. Only one event was

reported felt by a resident and was described as weak shaking with a maximum Intensity of II on the Modified Mercalli Intensity Scale.

The HVO says that clustering of shallow earthquakes in this region does not mean an eruption is imminent. In a statement released by USGS, scientists there said, “HVO has recorded shallow earthquakes in this area for many decades across several eruptive cycles at both Kilauea and Mauna Loa. These earthquakes may result from changes in the magma storage system and/or may be part of normal re-adjustments of the volcano due to changing stresses within it. Other monitoring data streams for Mauna Loa and Kilauea, including ground deformation, gas, and imagery, show no significant changes in activity.”

While there are no signs of an imminent eruption, USGS wants people prepared for the possibility of an eruption here. Earlier this month USGS cautioned, “While an eruption of Mauna Loa is not imminent, now is the time to revisit personal eruption plans. Similar to preparing for hurricane season, having an eruption plan in advance helps during an emergency.”

With another eruption on Mauna Loa inevitable, although the timing is not yet defined, the USGS is urging people on Hawaii to have a personal response plan, prepare a “go bag”, and determine what one would do in the event of an eruption at different times of the day or week.

“The most important thing you can do is to have a personal response plan,” says the USGS. Document what you’d do when a volcano erupts and make sure your family and friends are aware of what that plan is.

USGS suggests getting a “go bag” in order. “Nowadays, people pack “go” bags containing essential items in case you have to leave your house under an evacuation order. You may want to include important documents, like your birth certificate, deeds, legal papers, and medications.” Mauna Loa is considered the largest active volcano on Earth, rising to 13,681 feet above sea level. Mauna Loa rises up from the ocean floor of the Central Pacific at a depth of about 3 miles. Because of the volcano’s significant mass, the ocean floor directly beneath Mauna Loa is depressed by another 5 miles. According to USGS, this places Mauna Loa’s summit about 56,000 feet above its base; the enormous volcano covers half of the island of Hawaii, also known simply as the “Big Island of Hawaii.”

Mauna Loa eruptions tend to produce voluminous, fast-moving lava flows that can impact communities on the east and west sides of the Big Island from Kona to Hilo. Since the 1850s, Hilo in eastern Hawaii has been threatened by 7 Mauna Loa lava flows. On the south and west sides of the island, Mauna Loa lava flows have reached the coast there 8 times: in 1859,

1868, 1887, 1926, 1919, and three times in 1950. Mauna Loa is one of 5 volcanoes that make up Hawaii's Big Island. The oldest volcano on Hawaii Island is Kohala, which is more than one million years old. Kilauea is the youngest, at an estimated 300,000-600,000 years old. Mauna Loa is the second youngest volcano on the island, estimated to be about 700,000 years old.

After being quiet for nearly 2 years, Kilauea began erupting again in December. While lava is erupting on the surface at this volcano, it is contained within a lava lake deep inside Kilauea's caldera. Lava is not threatening any community at this time; other than its glow reflected in the night sky, lava is not visible from viewing areas within Hawaii Volcanoes National Park at this time. HVO continues to closely monitor geologic changes, seismicity, deformation, and gas emissions at Mauna Loa and Kilauea volcanoes. According to the USGS, HVO will issue additional messages and alert level changes as warranted by changing activity.

#### **14.5 M4.1 Earthquake Near Reykjanes Eruption Site**

**Source:** icelandreview.com, 21 April, 2021



**Golli. People admiring the Reykjanes peninsula eruption from the edge of the flowing lava**

An earthquake of magnitude 4.1 was detected on the Reykjanes peninsula at 11.05pm last night. It is the largest earthquake that has been detected on the peninsula since the eruption in nearby Geldingadalir began on March 19. The earthquake is likely due to “stress movements in the earth’s crust due to the eruption,” according to the Icelandic Met Office.

For several weeks leading up to the eruption, a strong earthquake swarm originating on the Reykjanes peninsula shook South and West Iceland with quakes as strong as M5.7. The earthquakes died down as soon as magma broke the surface on March 19, indicating that a build-up of tension was being released. Last night’s earthquake was felt in the Reykjavik capital area as far away as Hella and Grundarfjörður in South and West Iceland respectively.

### **Eruption Shows No Signs of Stopping**

It has been just over a month since the eruption began and it shows no signs of stopping. While the eruption began at one location on March 19, additional vents have since opened up along the same fissure. Lava from the eruption has filled the Reykjanes peninsula’s Geldingadalir valley completely and is now flowing into surrounding lowlands.

Though the site’s northernmost vent (which opened on Easter weekend) stopped erupting around April 18, the eruption’s lava flow has not diminished overall – in fact, it appears to have increased. “Since the eruption began about 30 days ago, it has been constantly changing,” stated Sara Barsotti, the Met Office’s Volcanic Hazards Co-ordinator. “Now there is no magma flowing out of the first crater that opened outside Geldingadalir, that for example reflects this constant change and it is not certain that the crater has gone to sleep permanently,” says Sara. “Therefore, it cannot be confirmed that these are the first signs that the eruption is subsiding. On the contrary, the latest summary of our colleagues at the University [of Iceland] shows that lava flow has not decreased and has even increased in recent days.”

## **14.6 92 Earthquakes and Tremors Recorded Over Weekend at Mount Nyiragongo Volcano in Africa**

**Source:** people.com,31 May,2021

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A volcano that erupted earlier this month experienced more activity over the weekend as scientists recorded dozens of earthquakes and tremors throughout a 24-hour period.





Mount Nyiragongo volcano, located in the Democratic Republic of Congo in Africa, erupted on May 23, killing 31 people and sparking an evacuation in the nearby city of Goma, CNN and BBC reported. Nyiragongo, one of the world's most active volcanoes, had last erupted in 2002, and the incident left 250 dead and 120,000 without homes, according to BBC.

A week after its latest eruption, scientists have recorded 92 earthquakes and tremors at the volcano, CNN noted.

Some of the quakes were felt at least 65 miles away in Kigali, the Rwandan capital.

"There were 92 earthquakes and tremors in the last 24 hours," Constant Ndima, the military governor of North Kivu, told the outlet. "Only 4 were felt by humans, the rest were only picked up by instruments."

Dario Tedesco, a volcanologist, said the recent activity is being caused by "a rift in the regional faults." He believes the gray ash seen coming out of the volcano in recent days is caused by Nyiragongo's crater floor collapsing.

"The top that was frozen is now going down," he told CNN. "It's gently, not violently, going in. It's nothing to worry about."

Tedesco, who has studied Nyiragongo for over two decades, said he cannot rule out the possibility of another eruption in coming days, and urged caution for Goma residents looking to return home.

An additional BBC report said scientists are worried about underground magma that has been moving toward Lake Kivu, located near Nyiragongo on the border between the Democratic Republic of the Congo and Rwanda.

They believe a rare eruption could release a lethal cloud of gas that could threaten Goma's population.

"There's a magma under the ground here in town that could erupt at any moment apparently," a resident told the outlet. "It's quite scary."

Scientists are unsure of the possibility such an event, but remain on alert.

"The best that anyone can do at the moment is be really cautious," volcanologist Robin George Andrews told BBC. "I'm really glad to see that areas are being evacuated just in case the worst happens."

## **14.7 Reykjanes Eruption Could End With Earthquake Swarm**

**Source:** icelandreview.com,30 June ,2021



The ongoing eruption on Iceland's Reykjanes peninsula was kicked off by a strong earthquake swarm, and it could take another such swarm to end it.

That's one of Volcanologist Þorvaldur Þórðarson's hypotheses about how the eruption could eventually come to a close, but it is indeed just a hypothesis. Experts have oft underlined that there is no reliable way to predict when the eruption will end.

"There are no clear signs that the eruption is ending," Þorvaldur stated on Bylgjan radio station this morning. Before it began more than three months ago, the eruption was preceded by weeks of strong earthquakes, felt across the capital area and South and West Iceland. Þorvaldur believes another such earthquake swarm could be what stops the eruption, which is located along a rift between two tectonic plates. As the plates move apart, they create tension in the earth's crust which is released in the form of seismic or volcanic activity.

"Such plate movements appear to have instigated this eruption and I suspect that maybe something similar is required to end it," Þorvaldur stated. Until such movement happens, the eruption may continue, and experts have already stated that could be years or decades. Until then, the eruption is "like a pipe that's always open. It's dripping steadily. And there's no tap to screw shut. They forgot to buy one," Þorvaldur joked in the morning interview.

While volcanic activity at the eruption site briefly paused on the night of June 28, it resumed again some hours later. Þorvaldur says there are once more considerable magma jets spewing from the active crater and visible lava flow over a large area, including Meradalir valley.

## **14.8 Tsunami warning after major earthquake off coast of Alaska**

**Source:** metro.co.uk, 29 July, 2021

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A major earthquake has rocked the Alaska Peninsula, with fears that a tsunami could soon follow.

People living close to the coast have been urged to move to higher ground as tsunami sirens were set off in the city of Kodiak.

The quake has a magnitude of 8.2 – the strongest of the year – and took place 20 miles under the sea, according to the U.S. Tsunami Warning System.

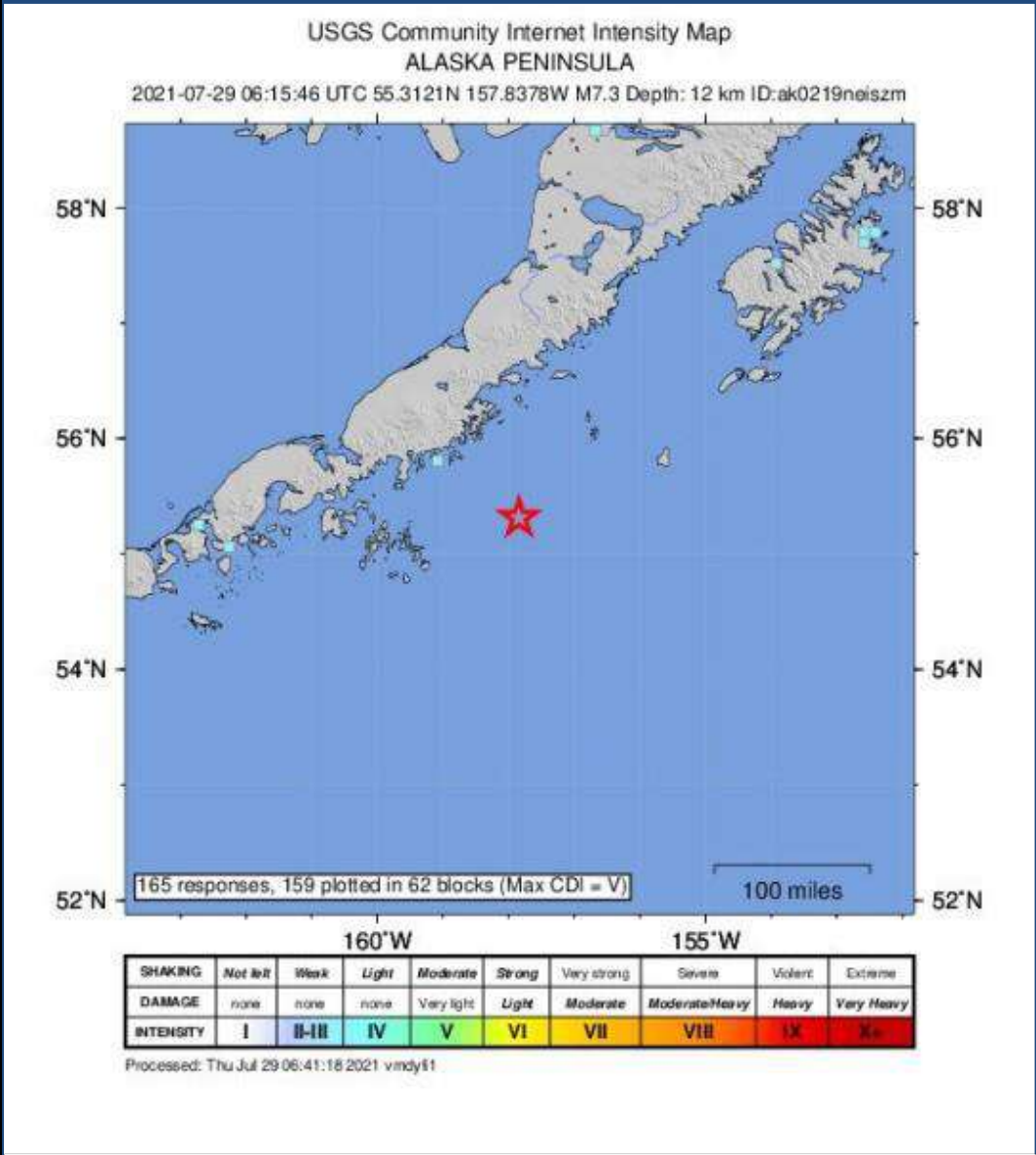
It struck 60 miles south-east from the the city of Chignik at 10.15pm local time, the service added.

Tsunami warning have also been issued for the U.S. Pacific territories of Guam and the Northern Mariana Islands.

Hawaii is under a less serious tsunami watch, while officials as far away as New Zealand are assessing the threat.

The U.S. Geological Survey (USGS) said the earthquake’s magnitude was 7.2 and took place 22 miles below sea level.

Parts of Alaska, including the southern peninsula, are in the Ring of Fire, an area known for frequent earthquakes and volcanic



**Residents living in coastal villages have been urged to move to higher land**

eruptions.

Nearly 75% of the world’s active volcanoes are inside the ring around the pacific ocean and some 90% of earthquakes take place there.



## 14.9 Earthquake swarm rocks the ground at Hawaii's Kilauea volcano

**Source:** [livescience.com](https://www.livescience.com/27-August-2021), 27 August, 2021



**A lava lake inside the Pu'u 'Ō'ō crater in Kilauea's' eastern rift zone during a previous eruption**

Kilauea volcano gave scientists and local Hawaiians a scare this week, when a swarm of more than 140 earthquakes in just 12 hours prompted authorities to raise the alarm over a possible imminent eruption.

But now, Kilauea's brief rumble is over; the volcano did not erupt and is barely registering any earthquakes, the U.S. Geological Survey (USGS) reported on Thursday (Aug. 26).

However, Kilauea's flare of activity set scientists on edge. The earthquake swarm occurred between 4:30 p.m. local time (10:30 p.m. EDT) Monday (Aug. 23) and 4:30 a.m. local time (10:30 a.m. EDT) Tuesday (Aug. 24) beneath the south part of Kilauea's summit caldera, with a peak in activity around 1:30 a.m. local time (7:30 a.m. EDT) Wednesday, according to the USGS.

The earthquakes were tiny; most registered at below magnitude 1.0, with the most violent reaching magnitude 3.3. The tectonic activity also coincided with a shift in the ground formation to the west of the swarm, which the USGS said "may indicate an intrusion of magma occurring about 0.6 to 1.2 miles (1 to 2 kilometers) beneath the south caldera."



As a result, the USGS raised the alert level for Kilauea from advisory/yellow to watch/orange, meaning an eruption was possible but not immediately imminent. Throughout the ordeal, there was no evidence of lava at the surface of the caldera — a large depression formed at the summit of the volcano, which was created by a previous eruption. Moreover, scientists did not detect any unusual activity at either of the volcano's two rift zones — a set of linear cracks on the sides of vents that are a common feature of shield volcanoes — to the east and southwest, according to the National Park Service (NPS). Levels of sulfur dioxide and hydrogen sulfide, two toxic gases produced during eruptions, also remained low, according to the NPS.



**Lava pours out of a crack in the southwest rift zone during the most recent eruption of Kilauea**

Scientists and local residents were able to breathe a sigh of relief on Thursday, when the USGS downgraded the alert level to Advisory/Yellow. This was in response to diminished earthquake and ground deformation activity, which is indicative of magma movement underground.

"Within the past 24 hours, only 10 earthquakes have been detected in this area," the USGS said in a statement released Thursday. "These observations indicate that the immediate potential for an eruption is diminished at this time."

Kilauea, which is a shield volcano located on the Big Island of Hawaii, is one of the most active volcanoes on Earth. Like other shield-shaped volcanoes, it formed over hundreds of thousands of years as runny lava erupted and flowed down its gradual slopes. It has erupted 34 times since 1952,

including for 35 years continuously at a single vent between 1983 and 2018, according to the Associated Press. The most recent eruption began Dec. 20, 2020, and ended May 23, 2021. Kilauea had been quiet since May, according to the USGS.

However, earthquake swarms like the one just detected have preceded major eruptions in recent years. More than 600 earthquakes were recorded at Kilauea, including more powerful quakes of magnitude 5.0, before a massive eruption on May 3, 2018, that destroyed residential homes and roads in the nearby Puna district, Live Science previously reported. Prior to that eruption, geologists also noticed an intrusion of magma by the volcano. But even then, scientists weren't sure whether it would erupt.

"That's the million-dollar question," Janet Babb, a geologist and Hawaiian Volcano Observatory spokesperson, told Live Science in 2018. "Magma can intrude in an area and never reach the surface. But an intrusion of magma can also result in an eruption."

Increased earthquake activity was also recorded before the start of the most recent eruption, Live Science previously reported.

#### **14.10 Largest underwater eruption in history creates new monster volcano**

**Source:** dnaindia.com,30 September,2021



A massive earthquake activity that began in May 2018 and was felt all around the world has given rise to a new undersea volcano. The massive

new structure rises 820 metres (2,690 feet) from the seafloor off the eastern coast of Mayotte, which surfaced after an earthquake that shook the island in May 2018.

Researchers are using the new feature, which is likely to be part of a tectonic structure between the East African and Madagascar rifts, to better comprehend inner Earth mechanisms about which very little is known.

The continuing event's earthquake thuds commenced on 10 May, 2018. A magnitude 5.8 earthquake struck a few days later, on May 15, shaking the surrounding island.

Scientists were previously baffled, but didn't take too long to realise that a massive volcanic eruption had taken place, unlike anything ever observed. The readings indicated a spot about 50 kilometres off the coast of Mayotte, a French province that lies in the volcanic Comoros islands situated among both Africa's east coast and Madagascar's north part.

The discovery was achieved by a team of researchers headed by geophysicist Nathalie Feuillet of the University of Paris in France. In February of 2019, the team began investigating the area. The researchers also installed a series of seismometers on the seabed, reaching depths of up to 3.5 kilometers, and merged the findings with Mayotte seismic readings.

This technology observed 17,000 seismic occurrences between February 25 and May 6, 2019, at depths ranging from 20 to 50 km underneath the water's surface.

It all began with a lava pool buried deep within the asthenosphere, the hot mantle layer right beneath Earth's lithosphere. Damage to the lithosphere may have resulted from tectonic forces beneath, resulting in seawalls that flowed molten from a source up through the crust, causing waves of earthquakes. This sediment later spread to the seafloor, where it erupted, resulting in 5 cubic kilometres of magma and the creation of a new volcano.

The Mayotte eruption is the largest underwater seismic outburst in history. The total volume of the new volcanic structure is between 30 to 1,000 times bigger than prior deep-sea eruptions, according to estimates from May 2019.

#### **14.11 La Palma island braces for more earthquakes as volcano roars on**

**Source:** [channelnewsasia.com](https://www.channelnewsasia.com), 28 October, 2021

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LOS LLANOS DE ARIDANE, Canary Islands: Residents on Spain's La Palma island braced on Wednesday (Oct 27) for the possibility of bigger

earthquakes that could compound the damage from a volcano spilling lava more than five weeks since it erupted.



Seismologists said a 4.6 magnitude earthquake shook the island a day after they recorded a 4.9 magnitude quake that was the strongest so far of the hundreds that have occurred under La Palma since the volcano's Sep 19 eruption.

So far, the earthquakes have either been small enough or far enough under La Palma to do no harm, other than adding to the anxiety of the island residents. The Tuesday earthquake was felt up to 96km away on three other segments of the Canary Islands, an archipelago off northwest Africa.

“The scientific committee has been warning for more than a week that we could see earthquakes, given their recent depth of around 12 kilometres and their magnitude, that reach a magnitude of 6 (on the Richter scale),” María José Blanco, director of Spain’s National Geographic Institute on the Canary Islands, told Spanish national broadcaster RTVE.

Flows of molten rock from the Cumbre Vieja volcano itself have caused the evacuations of about 7,500 people and destroyed more than 2,000 buildings, mostly homes. The rivers of lava cover over 900 hectares of mostly farmland, while one major flow is extending the island into the Atlantic as it cools.

No deaths have resulted from the eruption. Other than in an area on the island’s western side, life continues as normal for La Palma's 85,000 residents except for having to clean up volcanic ash.

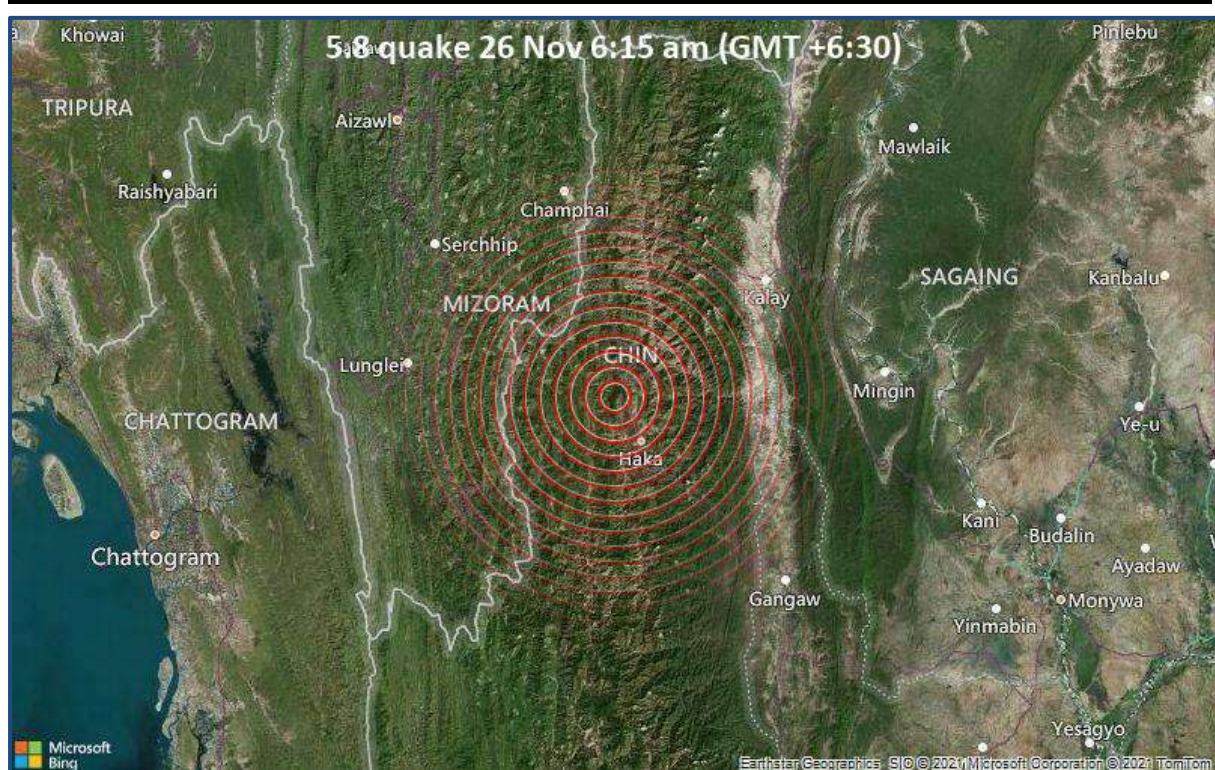


The last eruption on the island, in 1971, lasted 24 days. Its longest, in 1949, lasted 47 days. The current activity is on day 39 and shows no signs of stopping.

“We saw the worst-case scenario in the 1949 eruption, when a second volcano mouth opened up and cut off the southern part of the island, which had to be supplied by boat,” volcano scientist Vicente Soler said. “That is highly improbable, although not impossible, today.”

#### **14.12 Significant magnitude 5.8 quake hits 21 km northwest of Hakha, Myanmar (Burma) early morning**

**Source:** volcanodiscovery.com, 26 November, 2021



#### **5.8 quake 26 Nov 6:15 am (GMT +6:30)**

A magnitude 5.8 earthquake near Hakha, Chin State, Myanmar (Burma), was reported only 20 minutes ago by the United States Geological Survey, considered one of the key international agencies that monitor seismic activity worldwide. The earthquake occurred at a moderately shallow depth of 42.1 km beneath the epicenter early morning on Friday, November 26th, 2021, at 5:45 am local time. The exact magnitude, epicenter, and depth of the quake might be revised within the next few hours or minutes as seismologists review data and refine their calculations, or as other agencies issue their report.



A second report was later issued by Italy's National Institute of Geophysics and Volcanology (INGV), which listed it as a magnitude 6.1 earthquake. Other agencies reporting the same quake include the German Research Centre for Geosciences (GFZ) at magnitude 6.0, and the European-Mediterranean Seismological Centre (EMSC) at magnitude 5.8.

Generally quakes of this magnitude are recorded by more than one agency and the results can vary, with subsequent reports that come in after the first one often showing more accuracy.

Based on the preliminary seismic data, the quake was probably felt by many people in the area of the epicenter. It should not have caused significant damage, other than objects falling from shelves, broken windows, etc.

In Hakha (pop. 20,000) located 21 km from the epicenter, Palan (pop. 5,400) 22 km away, Saiha (pop. 22,700) 64 km away, Lunglei (pop. 52,700) 79 km away, and Serchhip (pop. 20,200) 87 km away, the quake should have been felt as light shaking.

Weak shaking might have been felt in Mawlaik (pop. 44,500) located 131 km from the epicenter.

VolcanoDiscovery will automatically update magnitude and depth if these change and follow up if other significant news about the quake become available. If you're in the area, please send us your experience through our reporting mechanism, either online or via our mobile app. This will help us provide more first-hand updates to anyone around the globe who wants to know more about this quake.

### **14.13 5.3 magnitude earthquake jolts parts of AJK, Gilgit Baltistan**

**Source:** dunyanews.tv,27 December,2021

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MUZAFFARABAD (Dunya News) – Moderate 5.3 magnitude earthquake jolted parts of Azad Jammu and Kashmir and all districts of Gilgit Baltistan.

According the details garnered, tremors were felt in different districts of Azad Kashmir including Skardu and Shigar.

The earthquake occurred at a shallow depth of 10 km beneath the epicenter, at 6:31 pm local time.

Fearing any untoward situation, people of the areas vacated their homes in panic.

No casualties or damage were reported from the quake and aftershocks were also felt.

### **Mysteries behind earthquakes**

Earthquakes are a natural disaster that has killed millions of people around the world. According to experts, the earth's crust is made up of three large plates. The first layer is called Eurasian, the second Indian and the third Arabian. When heat accumulates underground, these plates slide. The earth shakes and this condition is called earthquake. Earthquake waves strike in a circle.

Earthquakes or volcanic eruptions are more common in areas at the confluence of these plates. Experts say that once a major earthquake occurs in the area, there could be another major earthquake. Two-thirds of Pakistan's territory is on fault lines, which could cause an earthquake in these areas at any time.

The cities from Karachi to Islamabad, Quetta to Peshawar, Makran to Abbottabad and Gilgit to Chitral are all affected by the quake, with Kashmir and Gilgit-Baltistan being the most sensitive areas. Pakistan is the fifth most earthquake prone country in the world.

Pakistan is located on the northern border of the Indian plate where it meets the Eurasian plate. The sinking of the Eurasian plate and the advancement of the Indian plate has been going on for millions of years. All fault lines running under two-thirds of Pakistan's territory are operational, where intermittent or moderate earthquakes occur intermittently.

Kashmir and Gilgit-Baltistan are located on the last northern border of the Indian plate, so these areas are considered the most sensitive. Major cities like Islamabad, Rawalpindi, Jhelum and Chakwal are included in Zone III. The underground cities of Quetta, Chaman, Loralai and Mastung are located on the west bank of the Indian Plate, hence it is also called High Risk Zone or Zone Four.

Some coastal areas of Sindh, including Karachi, are on the dangerous fault line zone. This coastal area is located at the junction of 3 plates, which poses a risk of earthquakes and tsunamis.

Experts say that not only the Upper Sindh and Central Punjab areas in Pakistan are on the fault line, so these areas can be considered safe from earthquakes.

On the other hand, in ancient times, strange traditions and stories were attributed to earthquakes. As we heard in our childhood, a huge bull has lifted the earth on one of its horns. When he changes his horn, there is an earthquake.

Greek mythology tells of an earthquake when Poseidon, the god of the sea, pierces the earth with his spear. Ancient Greek philosophers believed that the earth was full of gases. When the gases try to get out, an earthquake occurs.

Until the 18th century, Western scientists, including Newton, supported the idea that earthquakes were caused by the eruption of flammable substances in the earth's crust.

John Weddell, an expert at the University of South Carolina at Los Angeles, says that the rock layers in the earth's crust are in constant motion, and when they slide out of place, there is intense pressure on their edges, and when that pressure reaches a certain level. When it arrives, it appears in the form of an earthquake.

Earthquakes damage things on the surface of the earth. Buildings and other installations collapse. Roads are broken. Trees and power poles collapse. If there are rivers or lakes in the affected area, their location may change. There may be cracks in the mountains.

The epicenter was reported below the ocean floor, however; no tsunami alert was issued. The epicenter was reported below the ground, however; no tsunami alert was issued.

The layers of rock beneath some parts of our earth are of such a nature that they are relatively mobile. Therefore, earthquakes also occur frequently in these areas. Some countries and regions are located in the earthquake zone. These include New Zealand, Indonesia, the Philippines, Japan, Russia, the Pacific coast in North America, Central America, Peru and Chile. Similarly, many parts of the Pacific Ocean are also included in the areas where there is a risk of more earthquakes.

### **What is the Richter Scale?**

The Richter scale is a scale used to measure the magnitude of an earthquake. The inventor of the Richter scale is Charles Richter, an American scientist who introduced a device in 1935 that can measure earthquakes on a scale of one to 10.

## **Types of earthquakes**

Earthquakes are generally divided into three types. Earthquakes of less than four magnitude on the Richter scale are called mild or weak earthquakes because no greater damage is expected.

An earthquake of magnitude four and less than six is called a moderate magnitude earthquake, which can cause minor damage, such as breaking sugar pots and plates. Earthquakes of magnitude 6 to 7 on the Richter scale can damage buildings. When the magnitude of an earthquake exceeds 8, it can become catastrophic. Buildings can turn into rubble, roads and railway lines can be damaged.

## **What to do in an earthquake?**

In the event of an earthquake, move to an open space outside the building immediately. If it is not possible to get out, take shelter under a table or other similar object to protect yourself from possible debris falling from the roof or walls. Stay away from windows, heavy furniture and large appliances during an earthquake



# ***CLIMATE ACTION***

# ***CALENDAR 2022***



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